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### REVIEW OF THE JUGLANDACEAE IN THE U. S. S. R.

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*Plates 19 and 20*

The Juglandaceae in U. S. S. R. are represented by a single species of the small genus *Pterocarya* Kunth and by five of the more recent and much more extensive genus *Juglans* L.

Representatives of this family forming part of the broad-leaved tertiary forests occur wherever remnants of such forests are still found, notably in the Caucasus, on the mountains of Turkestan and in the Far East.

Fossil remains of the Juglandaceae have been found in many parts of the Union,<sup>1</sup> often not only where Walnuts no longer occur but where even no broad-leaved trees and, in some cases, no forests of any kind survive. Thus remains of *Juglans acuminata* A. Br., closely allied to the present *J. regia* L., and *J. nigella* Heer were recorded from Sakhalin; *J. cinerea* L. and other fossils of *Juglans* were found in Eastern Siberia on the river Aldan; *J. acuminata* A. Br. and *J. (Pterocarya) densinervis* Schm. in the neighborhood of Tomsk, *J. crenulata* Schm. and *J. (Pterocarya) densinervis* Schm. jointly with other broad-leaved trees in southern Altai on the river Bukhtarma; *J. acuminata* A. Br. and *Pterocarya castaneaefolia* Goepp. on the Irtysh near Tara; on the source of the same river, in the neighborhood of the mountain Ashutas, remains of *Juglans* have also been discovered among 70 fossil forms of plants belonging to 32 families; near the northern

<sup>1</sup>HEER, *Flora Foss. Arct.* v (1878).

KRYSTOFVICH, A. The Butternut (*J. cinerea* L.) from Fresh-water Deposits of the Province of Jakoutsk. (*Mém. Comité géologique*, N. S. Livr. 124 [1915]).

JANICHEVSKY, M. Sur la flore du Miocene des environs de la ville de Tomsk. (*Mém. Comité géolog.* N. S. Livr. 131 [1915]).

SCHMALHAUSEN, J. Ueber tertiäre Pflanzen aus dem Thale des Flusses Buchtarma am Fusse des Altaigebirge. (*Palaeontographica*, xxxii [1887]).

KRYSTOFVICH, A. Contribution to the Neogene Flora of the Irtysh Basin, West Siberia. (*Bull. Comité Géologique* Len. xlv, No. 7 [1927]).

NEIBURG, M. Sur les matériaux de l'expédition d'Ashutas du Musée Géologique de l'Ac. d. Sc. de l'URSS. (*Comptes Rend. Acad. Sci. URSS.* 1928).

PALIBIN, J. W. Die fossilen Pflanzenreste der Küsten des Aralsees. (*Mitt. Turkest. Abt. Russ. Geogr. Ges.* iv. [1907]).

PALIBIN, J. W. Notice sur la flore tertiaire dans la steppe Kirghize. (*Bull. Com. Géol. Len.* xxiii. [1904]).

KRYSTOFVICH, A., & J. PALIBIN. Matériaux nouveaux pour la flore tertiaire de Turgay. (*Bull. l'Acad. Sci. Petrogr.* ix. [1916]).

KRASNOW, A. N. Primitiae florae tertiariae Rossiae meridionalis. (*Travaux Soc. natur. Univers. Kharkow*, xliii [1909]).

KRYSTOFVICH, A. Preliminary note on some new findings of Early Tertiary and Post-tertiary Flora in South. Russia. (*Mém. Soc. Natur. Nouvelle Russie*, xxxix. [1914]).

shore of the Aral sea, at the summit of the Kara-Sandyk in a typically steppe country imprints of leaves of *J. acuminata* A. Br. have likewise been encountered. The same species has moreover been found on the river Chegan northwest of the Aral sea and with another species of a genus now absent from the Old World except a limited area in Eastern China and Tonkin, but well represented in the New World—*Carya* (*Hicoria*) *bilinica* Ung.—has been met with on the river Krynka, a tributary of the Mius, near Alexandrovka in the Taganrog district; the same *J. acuminata* A. Br. has been found in Miocene in the vicinity of Tim in the Kursk government. *J. (Carya) bilinica* Ung. has been further recorded from the Tiraspol district of the Kherson government and, lastly, *Pterocarya Masalongii* G. et Str. or a small leaf of *Carya bilinica* in the northern part (Khotin) of Bessarabia. Remains of the Juglandaceae will most probably be found some day still further north within the territory of the Union as they have even been found to occur in Greenland and Spitsbergen.

It thus appears that the former range of the genera *Pterocarya* and *Juglans* in the U. S. S. R. was much more extensive and reached as far as 61° N. Lat. Now members of the Juglandaceae in the wild state occur exclusively in warmer climates extending, however, as far North as Lat. 51° 13' N. in the Far East. The most extensively cultivated species is *J. regia* L. which is much grown all over the southern European part of the Union. In the neighborhood of Leningrad, i. e. in Lat. 60° N. the following *Juglans* both thrive and bear fruit: *J. cinerea* L., *J. mandshurica* Maxim., *J. stenocarpa* Maxim., *J. cathayensis* Dode and even the Japanese *Pterocarya rhoifolia* Sieb. & Zucc.; the highly frost resistant Japanese *J. Sieboldiana* Maxim. is likewise met with as well as *Pterocarya caucasica* C. A. M., the latter, however, in the form of a shrub.

Of the four sections of genus *Juglans*<sup>1</sup> but two, *Dioscaryon*, comprising about 7 Asiatic species with *J. regia* L. as the type and *Cardiocaryon* containing about ten, also Asiatic species, are met with in the U. S. S. R. Both these sections are easily distinguished by the sculpture of their nuts and in their geographical range. Section *Dioscaryon* which has a smooth nut ranges over western Europe, Asia Minor, the Caucasus, Persia, Turkestan, Afghanistan, the Himalayas, the mountains of India and Yunnan, while *J. sinensis* Dode even reaches the northern provinces of China, and *J. orientis* Dode the province of Senano in Japan. Section *Cardiocaryon* with sculptured nut extends, on the contrary, throughout the eastern part of Asia occurring in China, Manchuria, the Far East and Japan. In Yunnan both sections have their representatives.

As a consequence of such a distribution of these sections *J. regia* L. and *J. fallax* Dode of section *Dioscaryon* are met with in the Caucasus and in Turkestan, whilst *J. mandshurica* Maxim., *J. stenocarpa* Maxim., and *J. cathayensis* Dode of the section *Cardiocaryon* occur in the Far East.

<sup>1</sup> DODE, L. A. Contributions à l'étude du genre *Juglans*. (Bull. Soc. Dendr. France, 1906, N 2. 1909. N 11, 13. p. 67-112; 1909, p. 23-50, 166-215, figs.).



In the Caucasus, *Juglans* is represented by the Common Walnut, *J. regia*, occurring throughout Transcaucasia on the mountain slopes in the deciduous forests, sometimes ranging to an altitude of 1500 metres above the sea but only in the form of the cultivated tree reverted to its wild condition.<sup>1</sup> It apparently represents a survival of ancient native cultivation, became acclimatized and disseminated in the forests and although cut without discrimination is still preserved thanks to its high reproductive power. Remains of some kind of dwelling denoting the former presence of man, as a stone wall, broken bits of pottery, may usually be found in the vicinity of Walnut trees. Until quite recently *J. regia* L. has been considered indigenous to Talysh alone on the Persian frontier, but the latest investigations and observations of Prof. A. A. Grossheim, a well known specialist on the Talish flora, show that even in that locality the Walnut was formerly a cultivated tree. In any case, the range of the above mentioned species throughout the Caucasus and the diverse varieties, both wild and cultivated, require a detailed study.

*Juglans regia* L. is likewise found in the western part of Turkestan,<sup>2</sup> namely in the wooded gorges of the Kopet-Dag mountains. The arboreal vegetation of these gorges is but a scanty remnant of the former Astrabad moist forests. Here *Ficus carica* L., *Punica granatum* L., *Zizyphus vulgaris* L. are met with, as well as certain Caucasian plants, such as *Allium paradoxum* Don, peculiar but to the dense Transcaucasian virgin forests and a special form of *Iris acutiloba* C. A. M. separated as a distinct species. The influence of man having been exerted since a very early period, and several waves of peoples having left traces, it is sometimes difficult to decide whether the huge old Walnuts so often met with near brooks and streams are cultivated or wild trees. In any case, the region mentioned forms the extreme northern limit of *J. regia* L. Further East this species is supplanted by a closely related one, *J. fallax* Dode, characterized by small rounded hard-shelled fruit with a small kernel. This species is spread all over the Tian-Shan, namely the Pskem-Ugam mountains, the Chatkal and Fergana chains as likewise the Tadjikistan mountains (Gissar and Darvaz). In all these regions *J. fallax* enters into the composition of the broad-leaved forests forming its first story. In these forests the Walnut is associated with other trees, such as various representatives of the Maple (*Acer Semenowi* Regl. & Herd., *A. turkestanicum* Pax), Ash (*Fraxinus potamophila* Herd. and *F. sogdiana* Bge.), numerous varieties of the Apple-tree, with an underwood of various shrubs, such as: *Prunus cerasifera* Ehrh., *Prunus Mahaleb* L., the endemic shrub *Exochorda Korolkowi* Lavallé, *Evonymus Semenowi* Rgl. & Herd., *Abelia corymbosa* Reg. & Schmalh. and a number of others.

It seems worth noting that among the herbaceous vegetation are commonly found such northern forest plants as *Brachypodium silvaticum*

<sup>1</sup> It should be noted that in western Europe the Walnut ranges to the altitude of 1100-1300 metres, in the Tyrol of 1255 metres, in the Jura of 1070 metres.

<sup>2</sup> NEKRASSOWA, V. L. The genus *Juglans* in Turkestan. (Bull. Appl. Bot. xviii. 301 [1928]).

(Huds.) P. B., *Agropyrum caninum* (L.) R. et S., *Poa nemoralis* L., *Geranium silvaticum* L., *Brunella vulgaris* L., *Trifolium pratense* L., *Potentilla reptans* L., *Crepis sibirica* L., *Picris hieracioides* and others. Among the commoner plants is the shade-seeking *Impatiens parviflora* DC., a native of Turkestan, well acclimatized in western Europe and always found near dwellings.

In these forests, spreading over valleys and mountain gorges, Walnuts are always connected with damp and abundantly watered localities in the vicinity of water. The soils under these forests are very interesting: they are of a dark colour with a violet tinge, have a large content of humus and a peculiar structure. Occasionally Walnuts ascend on mountain slopes to a considerable altitude, up to 1850 or even 1915 metres, but always in damp places. In spring during the blossoming of apple- and plum-trees, walnut forests present a lovely sight, while in autumn, when all the trees and bushes are covered with ripe fruit they recall a beautiful garden. The local inhabitants call them "gardens" and during the summer months come to them for a rest-cure from the heat and malaria, while in autumn they are visited for collecting different fruits.

*J. fallax* Dode in Turkestan and *J. regia* L. in the Caucasus bear edible fruits which are exported in great quantities to the large towns of the Union. The leaves are used for medicinal purposes and the unripe husk yields a brown dye employed by the natives for dyeing homespun materials. But the greatest value of the Walnut lies in the wood itself and especially in the burl, an overgrown knot or excrescence on the trunk, which is greatly valued for veneer by cabinet-makers. Large quantities of burl are annually taken off the trees and exported to other countries.

Throughout the Caucasus and Turkestan, in every garden trees of *J. regia* L. may be met with, while a closely related species—*J. kumaonia* Dode—with very large fruits highly valued in the trade is sometimes found in the Zeravshan.

Outside the boundaries of the Union of S. S. R. *J. regia* L. extends over the Balkan peninsula, Asia Minor and Persia; *J. fallax* Dode into Persia, Baluchistan and India (according to Dode).

Under somewhat different conditions and in other surroundings occurs in the Far East the section of *Cardiocaryon*<sup>1</sup> consisting of *J. mandshurica* Maxim., *J. stenocarpa* Maxim., and *J. cathayensis* Dode. These three species closely related to each other are often treated as one under the determination of *J. mandshurica* Maxim.<sup>2</sup> And yet, they exhibit certain dissimilarities. Thus, *J. mandshurica* has viscid female flowers covered with glandular hairs, young leaves thickly covered with glands, and mature leaves

<sup>1</sup> WOLF, E. Die mandschurischen Wallnüsse. (Mitt. Leningrad Forstinstit. XXXIII. [1926]). SEVORTZOW, B. W. Fragmenta Florae Manchuriae. (Bull. Jard. Bot. Princ. U. R. S. S. XXVI. [1927]).

WOLF, E. Die mandschurischen Wallnüsse. (op. cit. XXVII. 349-352. [1928]).

STROGI, A. A. The manchurian walnut. (Bull. Appl. Bot. XVIII. no. 2, p. 247-302 [1928]).

SEVORTZOW, B. W. The Manchurian Walnut. (Manch. Research Soc. ser. A., fasc. 32 [1929]).

<sup>2</sup> KOMAROV, V. Act. Hort. Petrop. XXII. 9 (Fl. Manshur. II. [1903]).



with a glabrous upper surface, while the narrow elongated leaflets are acuminate, the fruits being ovate, of a dirty brown dull colour and show numerous uneven cavities. The flowers of *J. stenocarpa* Max. are thickly covered with hairs being destitute of glands; the young leaves are tomentose, the mature leaves covered with stellate hairs, the leaflets being short and acuminate, the fruit elliptical, glossy and brown with 4 large equal and several smaller cavities. The third species, *J. cathayensis* Dode, is related to *J. stenocarpa* Maxim, but differs in having hard thick, less hairy leaves with smaller indentations; the venation of the leaves is more pronounced; the testa of the seed dark brown, the fruit having a more constant form and numerous cavities. All these features are described by E. Wolf from his observations of species grown at the nurseries of the Institute of Forestry and at the Botanical Garden of Leningrad.

In the Far East the Walnut grows in the valleys of rivers and small streams being most frequently found in abundantly watered gullies and narrow gorges and occurs in mixed forests containing *Pinus koraiensis*, *Abies holophylla*, *Picea ajanensis*, *Acer mandshuricum*, *A. Mono*, *Fraxinus mandshurica*, *Ulmus campestris* and others, as well as in purely deciduous forests without any admixture of conifers. The Manchurian Walnut likewise occurs on river banks among a growth of various Willows, *Alnus hirsuta*, *Ulmus pumila*, *Prunus padus*, all the trees and shrubs there being entwined by the climbing plants of *Vitis amurensis*, *Calystegia rosea*, *Cuscuta japonica* and of other lianas; on the northern confines of its range it affects rocky slopes. It should be noted that in these regions the Walnut does not form pure close stands, but occurs in scattered individuals among the trees of the first story and even in the underbrush. It does not seem to ascend the mountain above an elevation of 300 metres. As it recedes from the centre of its range *J. mandshurica* exhibits a tendency to grow on southern well insulated slopes and gradually ceases to produce ripe fruit. The northern limits of its range appear to be the lower reaches of the rivers Bureja and the Girin, the neighborhood of Sofijsk and Borbi (51° 15' N. L.), while single specimens may be found on the upper and middle reaches of the river Tumdja which falls in to the Soviet Harbor (49° N. Lat.). Outside the Union of S. S. R. *J. mandshurica* Maxim occurs on the mountains of Manchuria (Chan-Guan-Wai-Lin) and of the Small Khingan, in northern Korea and in Jegol on the Eastern frontier of Mongolia. The geographical range of the two other species is not yet ascertained. Maximovicz<sup>1</sup> has recorded *J. stenocarpa* from the boundaries of Korea and, according to Dode, *J. cathayensis* Dode has an extensive range from the Amur to Szechuan and Hupeh, but as many specimens of *J. mandshurica* Maxim. from the Amur have been relegated by this author to *J. cathayensis* Dode, this indication needs further confirmation. Skvortsov<sup>2</sup> who has studied these trees in Manchuria maintains that they are

<sup>1</sup> MAXIMOWICZ in Bull. Acad. Sci. St. Pétersb. xviii. 57-59 and in Mém. Biol. viii. 630-632. (Diagn. Plant. Nov. Jap. Mandsh. Dec. xii.) (1872).

<sup>2</sup> SKVORTZOW, B. W., l. c.

there represented but by *J. mandshurica* Max. which in that region is distinguished by the form of fruit being subject to much variation.

All three species mentioned yield a very valuable wood for cabinet work as well as for aeroplanes and gunstocks but fail to produce burls similar to those of *J. regia* L. and *J. fallax* Dode. On account of the great strength of the timber the Koreans of Nikolsk-Ussurisk manufacture a special kind of wooden shoes called ni-van-seni from this tree. In consequence of the small size of its kernel and the hardness of the shell the nuts, although containing a high proportion of oil are seldom eaten. As an ornamental tree the Manchurian walnut is of much value on account of the rapidity of its growth, its capacity of developing a fine crown when growing in the open, longevity, freedom from infection and adaptability to different climates. Thus, the Manchurian walnut grows, for instance, in those parts of Manchuria where the mean annual temperature is but 2.6°, the winter being extremely cold, the summer hot and rainy and the period of vegetation only lasting 151 days.

*Pterocarya*, the other genus of Juglandaceae, consists of 7 species occurring chiefly in Central China (5 species), one species in Japan and *P. caucasica* C. A. Mey in the Caucasus and in Northern Persia. Within the Caucasus, *P. caucasica* is, like the Walnut, met with in the forests of Kolkhida and Lencoran, but while the Walnut is always connected with mountain slopes, this tree, on the other hand, grows but in very damp places chiefly along the river valleys. In western Transcaucasia, *P. caucasica*<sup>1</sup> occurs in the Batum lowlands, in Guria, Mingrelia, Imeretia, Abkhazia and the Chernomorsk government, the northern limit being the lower course of the river Shakhé near Sochi and its eastern near the town of Kutais. Within its range in all these regions this tree never ascending even the nearest foot hills occurs exclusively in swampy or low lying country subject to continuous flooding and it grows among alders—*Alnus glutinosa* Gaertn., various Willows and the Caucasian Blackberry, *Rubus caucasicus*, under whose shade flourish innumerable plants of the fern *Matteucia Struthiopteris*. *Pterocarya caucasica* C. A. Mey likewise grows in Georgia all over the valley of the river Alazan; in Azerbeidjan on all the lowlands adjoining the foot-hills as far as the Nukha and probably occurring in the region of the river Kuba. In Talysh<sup>2</sup> *P. caucasica* C. A. Mey grows along the banks of streams as well as on the sea coast in swampy places overgrown with *Alnus barbata* C. A. M. A number of various lianas and the endemic Lencoran Blackberry, *Rubus Raddeanus* Focke, characterize these forests. *Pterocarya caucasica* C. A. Mey thrives also in the forests of the lower and sometimes middle mountain zones, where the soil at the bottom of the gorges is ever moist, and torrential streams appear after heavy rain. The chief denizens of these forests are the "iron tree," *Parrotia persica* C. A. M., and the majestic Ghirkan, *Acer insigne* Boiss., characteristic of these

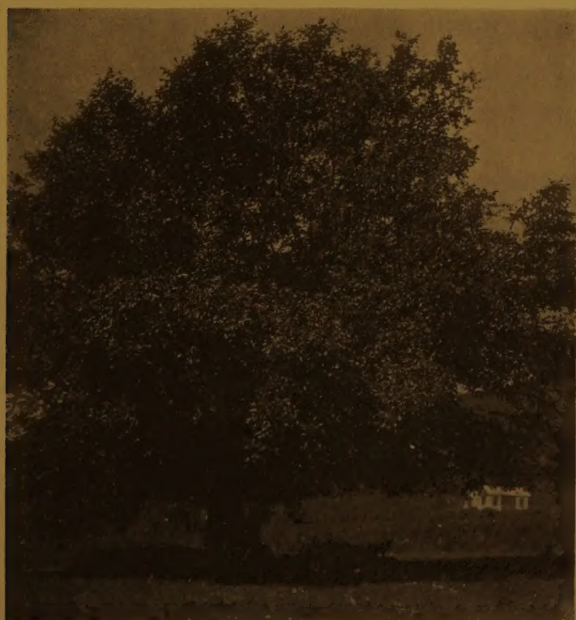
<sup>1</sup> MEDWEDJEW. Trees and bushes of the Caucasus. (1919).

<sup>2</sup> GROSSHEIM, A. The vegetation and the flora of Talysh. (Tiflis, 1920).





Clumps of *JUGLANS REGIA* L. in the valley of the Abashy River in Mingrelia,  
Western Caucasus.



Old planted tree of *JUGLANS REGIA* L. in Krasnaya Polyana, western Caucasus.





woods. Among the elements of the mountain forest should also be mentioned *Carpinus Betulus* L. and *Quercus castaneaefolia* C. A. Mey., as well as the Alder, *Alnus subcordata* C. A. Mey., typical of coast region forests. In the herbaceous covering are conspicuous the endemic plant of Ghirkan, *Solanum Kieseritzkii* C. A. Mey., the rare *Myriactis Gmelini* DC., while the most widely diffused are *Ilex aquifolium* L., *Danaë racemosa* (L.) Moench and various ferns which attain a luxuriant growth and frequently predominate over other types.

Beyond the Union of S. S. R. *P. caucasica* C. A. Mey., occurs but in the damp forests of northern Persia.

*Pterocarya caucasica* grows with great rapidity, lives long and reaches huge dimensions (up to 1 or 1.5 metres in diameter). Its wood is soft and not durable and is therefore used but for the manufacture of domestic articles such as cups, bowls, trays, tubs, troughs, etc. while shoes and cords for fastening boughs of growing vine as also shingles for roofs are made from its bast. The bark yields a very good tanning material. This tree is now being planted in moist places and along canals and ditches.

Botanic Garden, Leningrad, U. S. S. R.  
July 1929.

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## CHROMOSOME NUMBER AND BEHAVIOR IN THE GENUS SYRINGA

Plate 21

KARL SAX

MOST of the horticultural varieties of *Syringa* have been obtained from the species *vulgaris*, although *S. persica* and some of the Villosae lilacs are of considerable horticultural importance. The majority of the other species are not commonly grown, although some of them have considerable merit especially from the plant breeders standpoint. *Syringa pubescens* is one of the most fragrant of all lilacs but the flowers are not so attractive as those of the Common Lilac. *Syringa pinnatifolia* is also very desirable because of its unusual foliage and habit of growth, but the flowers are borne in small clusters and are rather inconspicuous. These two species should be especially valuable for breeding work. Combinations of the early blooming *vulgaris* varieties with the late Villosae species would undoubtedly be of value if they could be made. The Persian lilacs also offer interesting possibilities if they could be used in crosses with other species.

Considerable breeding and selection has been done with *S. vulgaris* and hundreds of new varieties have been introduced during the past fifty years. The work of Lemoine in France has been most conspicuous. New varieties have also been developed by John Dunbar in Rochester, New York, and by several nurserymen in Germany and Holland. Crosses have also been made between different species but comparatively few

of the horticultural varieties have been originated in this way. *Syringa chinensis*, one of the earliest species hybrids in the genus, is a hybrid between *S. persica* and *S. vulgaris*. Lemoine crossed *S. oblata* and *S. vulgaris* and obtained a number of desirable varieties which are known under the name *hyacinthiflora*. Miss Preston in Canada crossed *S. reflexa* and *S. villosa* and obtained desirable new varieties. The cross between *S. Josikaea* and *S. villosa* is known as *S. Henryi*, after the hybridizer, and some of these hybrids have considerable merit. In all cases the above crosses have been made between closely related species.

Attempts to cross species of the Vulgares group with those of the Villosae group have been made by Lemoine, Miss Preston, Skinner and others but, according to Mrs. McKelvey (4), hybrids have never been obtained between these two groups of lilacs.

According to Rehder (5) there are about 25 cultivated species of *Syringa*. *Syringa vulgaris* and *S. Josikaea* are native of southeastern Europe, *S. persica* is naturalized in western Asia, and *S. emodi* is indigenous on the western Himalayas. All other species are from eastern Asia.

The genus *Syringa* is divided into two subgenera, *Eusyringa* (K. Koch) and *Ligustrina* (Rupr.). The first subgenus is further divided into two groups, *Villosae* (Schneid.) and *Vulgares* (Schneid.). The *Villosae* group contains the species *emodi*, *yunnanensis*, *Josikaea*, *Wolfii*, *Sweginzowii*, *villosa*, *tomentella*, *reflexa*, and *Komarowi*. The *Vulgares* group includes *Julianae*, *velutina*, *microphylla*, *Palibiniana*, *pubescens*, *Meyeri*, *oblata*, *vulgaris*, *chinensis*, *persica* and *pinnatifolia*. The subgenus *Ligustrina* contains only three species, *pekinensis*, *amurensis* and *japonica*.

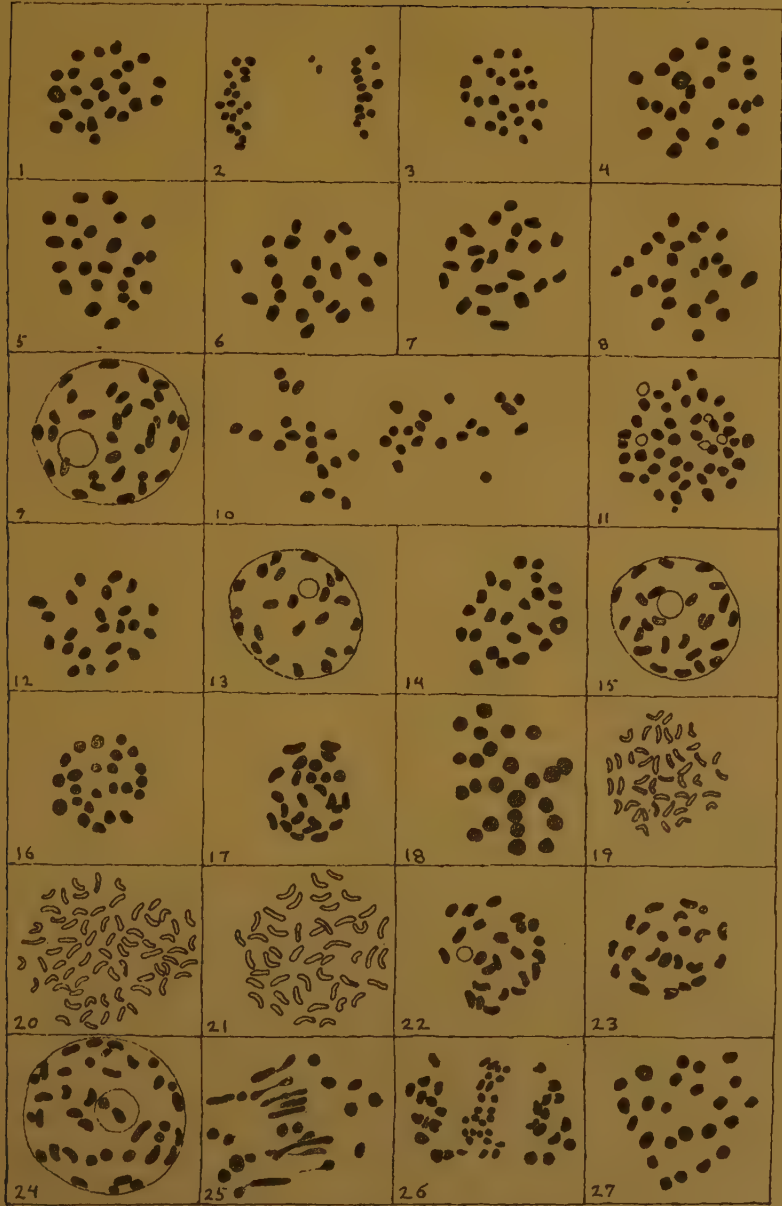
### THE VULGARES GROUP

*Syringa vulgaris* shows some variation in chromosome number. The variety "Beranger" has 24 pairs of chromosomes which divide regularly in the reduction divisions of the pollen mother cells. The chromosomes at the metaphase of the heterotypic division are shown in figure 1. One pair of chromosomes is consistently larger than the others and can usually be identified in most of the *Vulgares* species.

In the variety "Dr. Nobbe" there are 23 bivalents and one univalent at reduction. In figure 2 the bivalents are shown at the poles, although they cannot be counted in this figure, and the lagging split univalent is shown. In figure 3 the 23 chromosomes are shown at one pole. In this cell 23 chromosomes could be counted at each pole with the lagging chromosome between. The same type of chromosome behavior was found in the variety "Princess Marie."

There are 24 pairs of chromosomes in *S. pinnatifolia* including a large pair similar to that found in the *vulgaris* varieties. Chromosome behavior is regular during the reduction divisions. Figure 4 shows the chromosomes at the first metaphase. *Syringa pubescens* also has 24 pairs of chromosomes (fig. 5).





Chromosome number in the genus *Syringa*.





In *S. oblata Giralddii* there are apparently 24 paired chromosomes at diakinesis but only 23 could be counted at the telophase of the first reduction division (fig. 6). In no case were lagging chromosomes observed. Only 23 pairs of chromosomes were found in *S. Meyeri*. The chromosomes at first telophase are shown in figure 7. There are 24 pairs of chromosomes in *S. Palibiniana* at the first metaphase as shown in figure 8. There are 23 pairs of chromosomes at first metaphase in *S. velutina* (fig. 14) and in *S. Koehneana* (fig. 12). According to Rehder, *Koehneana* should be classed under *velutina*.

No counts were obtained from *S. microphylla* but the size of the pollen grain is the same as the other pure *Vulgares* species so that it presumably has 23 or 24 chromosomes.

All of the above species have been found growing spontaneously in Asia or southeastern Europe. *Syringa persica*, however, is usually found only as a cultivated plant and these forms are sterile; Meyer found a form of *persica* which is fertile growing wild in Kansu province, China. This spontaneous plant is similar to the cultivated variety *laciniata*. *Syringa persica* and its varieties *alba* and *laciniata* have sterile pollen and the chromosome behavior is very irregular in the reduction divisions. Unfortunately no chromosome counts were made of the spontaneous form but it has apparently normal pollen and the pollen grain size indicates that the chromosome number is the same as in the species already described.

In *S. persica* there are about 36 chromosomes at diakinesis as shown in figure 9. Similar counts were also obtained in the varieties *alba* and *laciniata*. At the heterotypic division there is usually no pairing of chromosomes and the single chromosomes apparently pass at random to one pole or the other. Such a stage in *S. persica* is shown in figure 10. In a number of cases where the division was almost completed approximately 18 chromosomes could be counted at either pole although in some cases the number varied considerably. In one pollen mother cell there were about 36-39 single chromosomes at metaphase, but occasionally several paired chromosomes could be seen. In *S. persica laciniata* about 44 chromosomes were counted in one cell (fig. 11), but usually the counts were the same as in the other two forms of the species. In the second division there are often from one to three lagging chromosomes but these were usually split. At times all of the chromosomes at the second division seem to be combined in one division figures and diads are found instead of tetrads. When tetrads are formed they usually show some irregularity in the size of the microspores.

*Syringa chinensis* is supposed to be a hybrid between *S. persica* and *S. vulgaris*. In the variety *Saugeana* there are about 39 chromosomes at diakinesis (figure 24). At metaphase there are usually 24 to 26 chromosomes. In one case there were clearly 24 chromosomes including one large pair typical of the species of the *Vulgares* group (figure 27). At the heterotypic division it was found that about half of these chromosomes

were paired and the other half singles. In figure 25 there are about 13 pairs and 13 singles seen in a side view of the heterotypic division. In the variety *cucullata* typical lagging chromosomes were observed and the number of bivalents and univalents is the same as found in *Saugeana*. In figure 26 the paired chromosomes are shown after they have divided and passed to the poles while the split univalents are just beginning to divide. Only a few lagging chromosomes were observed at the second division but the tetrads usually show a few lost chromosomes in the cytoplasm.

#### THE VILLOSAE GROUP

*Syringa villosa* has either 23 or 24 pairs of chromosomes but an exact count could not be obtained. Counts of *S. Josikaea* are available only from root tip material but it is clear that there are 46 somatic chromosomes (fig. 21). *S. Henryi* "Lutèce" is a hybrid between *villosa* and *Josikaea*. It has 23 pairs of chromosomes which behave regularly during the reduction division. The chromosomes at the late telophase of the heterotypic division are shown in figure 13.

*Syringa Sweginzowii* has 23 pairs of chromosomes as indicated by the figure (15) showing the chromosomes at the late telophase of the first reduction division. One plant of *S. yunnanensis* has 24 pairs of chromosomes as shown in figure 16 but in another plant about 68 somatic chromosomes were found in the root tip (fig. 20). The triploid condition of this plant may be due to somatic mutation although the chromosome count was consistent in the roots examined.

There are 23 or 24 chromosomes in *S. tomentella*. A late telophase stage is shown in figure 17. *S. Komarowi* has 23 pairs of chromosomes which are represented at metaphase in figure 18. Only somatic counts are available for *S. Wolfii* but there are apparently 46 somatic chromosomes in this species (fig. 19).

#### THE LIGUSTRINA GROUP

The species of the subgenus *Ligustrina* have the same chromosome number as the other pure species of the genus. Both *S. amurensis* and *S. japonica* have 23 or 24 pairs of chromosomes. The chromosomes at late telophase are shown in figures 22 and 23. No counts were obtained of *S. pekinensis*, but they are very probably the same as the other two species in this group of lilacs.

In all of the species examined with the exception of *S. persica* and *S. chinensis* the pollen grains appeared to be perfectly normal. The size of the pollen grains were the same in all of the pure species.

#### DISCUSSION

So far as chromosome number is concerned there is apparently no reason why crosses can not be made between species in different groups or subgenera of *Syringa*. Although numerous attempts have been made to



cross species of the *Villosae* group with those of the *Vulgares* group no hybrids have ever been produced. There is no record in Mrs. McKelvey's monograph concerning hybrids between the subgenera of *Syringa*. Crosses were made this year between *S. reflexa* and *S. amurensis* which have produced seeds, but it is too early to know whether the seeds are viable or if a hybrid has been produced. It may also be possible to cross species of the *Ligustrina* subgenus with species of *Ligustrum*. They are taxonomically very similar except in fruit characters and the chromosome number of all species of *Ligustrum* investigated is the same as found in the pure Lilac species. Crosses have been made between these two genera by Henry but no hybrids were obtained. Crosses between *Syringa* and the related genus *Forsythia* have also been made but did not produce seed. It is very improbable that this cross can be made because all *Forsythia* species examined have 28 somatic chromosomes.

*Syringa pubescens* has never been known to set seed in the Arnold Arboretum, although its chromosome behavior is regular and it forms apparently perfect pollen. Only a small amount of seed was set on *S. pinnatifolia*. It is unfortunate that these two species are so unfruitful here since they are among the most valuable for breeding work. Both species were crossed with all other species in the *Villosae* and *Vulgares* groups but few seeds were set. These species are not self sterile because single plants set seed in other localities, but the sterility here is probably due to physiological causes. They are both fertile in their native habitat and in cultivation in other localities. All of the other species are fertile and usually set seed in the Arboretum. Most Lilac species seem to be self fertile although *S. oblata* is said to be self sterile.

The chromosome behavior in *S. chinensis*, where there are approximately 12 paired and 12 single chromosomes, suggests that 12 is the fundamental number in the genus. This view is also supported by the fact that there are about 36 chromosomes in *S. persica*. In the *Vulgares* varieties there may be either 23 or 24 pairs of chromosomes or varieties may have 23 pairs and on univalent. Apparently the species and varieties with 23 bivalents have originated through the loss of a pair of chromosomes in a tetraploid parent. This variation in chromosome number is not limited to any one group in the genus.

*Syringa chinensis* (also known as *S. rothomagensis*) is believed to be a natural hybrid between *S. persica laciniata* and *S. vulgaris*. It was first obtained in 1777 by Varin, director of the Botanical Garden at Rouen, from seeds of *persica*. These seeds always produced the *chinensis* type. Varin believed that *chinensis* was a variety of *persica* but Henry in 1900 (2) and Lemoine in 1900 (3) described crosses between *persica* and *vulgaris* which produced *chinensis*.

The variety *Saugeana* originated in Varin's cultures. The Arboretum plant was obtained from Spaeth's nursery in 1900. *S. chinensis* is usually completely sterile although seeds have been reported on this species and

30 seeds grown at the Forestry Institute in Italy are reported to have produced plants of the *chinensis* type. This species has never set seed in the Arboretum.

If *S. chinensis* is a hybrid of *persica* and *vulgaris* the *persica* parent must have contributed about 12 chromosomes since there are approximately 12 bivalents and 12 univalents in *chinensis*.

*Syringa persica laciniata* in the Arnold Arboretum has 36-39 univalents and produces sterile pollen. According to Mrs. McKelvey this plant (no. 1036-2) has flowers identical in color with those of *S. persica*. She believes that it was grown from a cutting of *persica* with a preponderance of laciniate leaves. It was propagated from cuttings received from Hooper Bros. Pennsylvania in 1905. The cytological work tends to confirm Mrs. McKelvey's opinion.

The spontaneous *S. persica laciniata* is represented in the Arnold Arboretum by plant number 18,537 from the U. S. Dept. of Agriculture and originally from seed sent from China. Unfortunately no chromosome counts were obtained from this plant but it has perfect pollen and the pollen grain size suggests that there should be about 24 pairs of chromosomes although judging from the counts in *S. chinensis*, it should have about 12 pairs of chromosomes.

*Syringa persica* and the variety *alba* are undoubtedly hybrids. They usually have 36 single chromosomes which behave irregularly at reduction and the pollen is sterile. In some cases there are a few paired chromosomes and in these cases the chromosome behavior resembles that found in *chinensis*. Henry (2) believes that *S. persica* is a hybrid between *S. persica laciniata* and *S. vulgaris*. The cytological work supports this opinion since the chromosome number is about the same as in *S. chinensis* and in some cases the behavior at reduction is very similar. Perhaps different forms of the parental species would account for the taxonomic differences found between *chinensis* and *persica*.

The variety *laciniata* is certainly the only pure species in the *persica* group and it is the only one which has been found growing spontaneously. This form was introduced from Persia into southeastern Europe where it apparently crossed spontaneously with the native *vulgaris* and produced the hybrid forms, *persica* and *persica alba*. If the hybrid forms of *persica* originated in this way they should be classed as varieties of *S. chinensis*. The variety *laciniata* should be considered as the only true type of *persica*.

The chromosome behavior in the *persica* hybrids also indicates that the variety *laciniata* has 12 pairs of chromosomes, although the rare occurrence of pollen mother cells with as many as 44 chromosomes at the first reduction division may call for some other explanation of the chromosome complex.

The cytological work indicates the reason for sterility in *Syringa persica* and *S. chinensis*. The variety of *persica* introduced from China by Meyer is the only one which might be of value for breeding work, since it is the only one with good pollen. However, numerous crosses were made with



this form both as the seed and pollen parent but no seeds were obtained. The plant set no seeds in the Arboretum this year. In China it produces seed since it occurs spontaneously and seeds have been collected there, and in some years it produces seed in the Arboretum.

### SUMMARY

Most of the pure species of *Syringa* have either 23 or 24 pairs of chromosomes. In several *vulgaris* varieties there are 23 bivalents and 1 univalent. Apparently the species and varieties with 23 bivalents have lost a pair of chromosomes.

*Syringa chinensis*, which is a hybrid between *S. persica laciniata* and *S. vulgaris*, has about 12 paired and 12 single chromosomes at the first reduction division although the chromosome number and the amount of pairing is somewhat variable.

*Syringa persica* and the variety *alba* are undoubtedly hybrids. The chromosome number and behavior is similar to that found in *S. chinensis* and it seems probable that these forms of *persica* have also been derived from crosses of *S. persica laciniata*  $\times$  *S. vulgaris*. *Syringa persica laciniata* is the only pure species of the *persica* group. The chromosome counts in the hybrids indicate that the *laciniata* parent contributed 12 chromosomes to the  $F_1$  hybrids.

### LITERATURE CITED

1. BORGSTAM, E. (1922). Zur Zytologie der Gattung *Syringa* nebst Erörterungen über den Einfluss äusserer Faktoren auf die Kernteilungsvorgänge. (Arkiv. Bot. Bd. 17: 1-27. 1 taf.)
2. HENRY, L. (1900). Crossings made at the Natural History Museum of Paris from 1887 to 1899. (Jour. Roy. Hort. Soc. 24: 218-236.)
3. LEMOINE, E. (1900). Hybrids between the common lilac and the lacinated Persian Lilac. (Jour. Roy. Hort. Soc. 24: 299-311.)
4. McKELVEY, S. D. (1928). The Lilac. McMillan Co., New York. 581 pp. 172 pl.
5. REHDER, A. (1927). Manual of cultivated trees and shrubs. McMillan Co., New York. 930 pp.
6. TISCHLER, G. (1926). Allgemeine pflanzenkaryologie. Borntraeger, Berlin. 899 pp.

### DESCRIPTION OF PLATE

All figures of reduction divisions made from permanent smears except figure 18 which is from an aceto-carmin preparation. Magnification about 2500  $\times$ .

Fig. 1. *Syringa vulgaris* "Beranger." First metaphase with 24 pairs of chromosomes.

Fig. 2. *S. vulgaris* "Dr. Nobbe." Telophase with one univalent lagging chromosome.

Fig. 3. Same variety with 23 chromosomes at one pole in early telophase.

Fig. 4. *S. pinnatifolia*. 24 chromosomes at metaphase.

Fig. 5. *S. pubescens*. 24 chromosomes at metaphase.

Fig. 6. *S. oblata* Giraldii. 23 chromosomes at telophase of first division.

Fig. 7. *S. Meyeri*. 23 chromosomes at telophase.

Fig. 8. *S. Palibiniana*. 24 chromosomes at metaphase.

Fig. 9. *S. persica*. Diakinesis.

Fig. 10. *S. persica alba*. Irregular division of univalents.

Fig. 11. *S. persica laciniata*?. Metaphase.

- Fig. 12. *S. Koehneana*. 23 chromosomes at metaphase.  
 Fig. 13. *S. Henryi* "Lutèce." 23 chromosomes at telophase.  
 Fig. 14. *S. velutina*. 23 chromosomes at metaphase.  
 Fig. 15. *S. Sweginzowii*. 23 chromosomes at telophase.  
 Fig. 16. *S. yunnanensis*. 24 chromosomes at metaphase.  
 Fig. 17. *S. tomentella*. 24 chromosomes at metaphase.  
 Fig. 18. *S. Komarowi*. 23 chromosomes at metaphase.  
 Fig. 19. *S. Wolfii*. 46 somatic chromosomes.  
 Fig. 20. *S. yunnanensis*. 68 somatic chromosomes.  
 Fig. 21. *S. Josikaea*. 46 somatic chromosomes.  
 Fig. 22. *S. amurensis*. 24 chromosomes at telophase.  
 Fig. 23. *S. japonica*. 23 chromosomes at diakinesis.  
 Fig. 24. *S. chinensis Saugeana*. 39 chromosomes at diakinesis.  
 Fig. 25. *S. chinensis Saugeana*. Bivalents and univalents at first reduction.  
 Fig. 26. *S. chinensis cucullata*. The 13 bivalents have divided. The univalents are beginning to divide.  
 Fig. 27. *S. chinensis Saugeana*. 24 chromosomes at metaphase. Presumably half of these are univalents.

## CHROMOSOME NUMBER IN THE GENUS FORSYTHIA

JOSEPH O'MARA

THERE are, according to Rehder (1) six species of *Forsythia*. They are *suspensa*, *intermedia*, *viridissima*, *europaea*, *ovata* and *S. Girdalii* which is not in cultivation. The chromosomes of the five species in cultivation and their varieties were counted to determine if there was any relation between the chromosome number in *Forsythia* and the number in the closely related genera, *Syringa* and *Ligustrum*. It would also be of interest to know if the *Forsythia* species were inter-fertile, since a hybrid with the flowers of *intermedia spectabilis* and the hardiness of *ovata* would be of no little ornamental value.

The chromosomes could be counted satisfactorily by use of the iron-aceto carmine method described by Belling (2). The chromosomes were counted at the heterotypic metaphase and in some cases at the homotypic telophase.

The following counts were obtained:

<i>Forsythia suspensa</i> . . . . .	14	<i>Forsythia intermedia</i> . . . . .	14
var. <i>Sieboldii</i> . . . . .	14	var. <i>vitellina</i> . . . . .	14
var. <i>Fortunei</i> . . . . .	14	var. <i>primulina</i> . . . . .	14
var. <i>decipiens</i> . . . . .	14	var. <i>spectabilis</i> . . . . .	14
var. <i>pallida</i> . . . . .	14	var. <i>densiflora</i> . . . . .	14
var. <i>atrocaulis</i> . . . . .	14	<i>Forsythia viridissima</i> . . . . .	14
var. <i>pubescens</i> . . . . .	14	var. <i>koreana</i> . . . . .	14
		<i>Forsythia europaea</i> . . . . .	14
		<i>Forsythia ovata</i> . . . . .	14

In *Forsythia intermedia*, a hybrid between *F. suspensa* and *F. viridissima*, each parent contributed fourteen gametic chromosomes. These fourteen chromosomes proved to be perfectly compatible and no lagging was observed at either the heterotypic or homotypic divisions.

Since the gametic chromosome number in *Syringa* and *Ligustrum* is usually twenty-four it is obvious that the relation between the genus *Forsythia* and the genera *Ligustrum* and *Syringa* is a rather distant one.

#### LITERATURE CITED

1. REHDER, A. (1927). Manual of cultivated trees and shrubs. McMillan Co., New York. pp. 749-750.
2. BELLING, J. (1926). The iron aceto carmine method of fixing and staining chromosomes. (Biol. Bull., 50: 160-161.)
3. SAX, K. (1930). Chromosome number and behavior in the genus *Syringa*. (Jour. Arnold Arb. 11: 7-14.)

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### THE WOODY PLANTS OF SIGUATEPEQUE, HONDURAS

PAUL C. STANDLEY

DURING the winter of 1927-28 I was engaged in botanical exploration of the northern or Atlantic coast of Honduras, as the result of a coöperative agreement between the U. S. National Museum and the Arnold Arboretum, with the assistance of the United Fruit Company. Most of the season was devoted to an investigation of the flora of Lancetilla Valley, near Tela, in the Department of Atlántida, but toward the end of the winter a short collecting trip was made to the interior of Honduras.

Because of the limited time available for the visit, it was necessary to confine collections to a rather thorough exploration of a single locality, the vicinity of Siguatepeque, a small town in the Department of Comayagua, but a trip was made by automobile to the capital, Tegucigalpa, and it was thus possible to obtain a representative cross section of the vegetation of almost the whole extent of Honduras. This cross section does not show the variety that exists in a similar section across Guatemala or Costa Rica, but it does present many points of interest, and is rather typical of the vegetation of any given line drawn across Central America above Nicaragua.

The trip to Siguatepeque, despite the customary difficulties of transportation in this part of Honduras, was made in almost record time. It could have been made by the airplanes operated to the interior by the Tela Railroad Company, but airplane travel does not permit the attention to detail that is desirable in the case of systematic botanists, and it was deemed preferable to pursue the more prosaic but more practical and usual transportation routes. With the coöperation of the courteous officials of the Tela Railroad Company it was possible to make the whole trip to Siguatepeque in one day, a rather prolonged and hurried one, it is true, but still a single day.

Leaving Tela at three on a chilly moonlit February morning, in an already familiar motor car, a Ford which ran on the tracks of the banana railroad, we rode rapidly through the heavy wet tropical forest and banana plantations, the latter, as always, silvered by the moonlight,



and past swamps enveloped in fog, above which the Cohune and Royal Palms projected unsubstantially. Through more bananas we passed, then along the broad, sluggish, brown Ulua River, and finally, as day was breaking, reached the inland town of Progreso.

Here our baggage was transferred to an automobile, and we rode with it to the banks of the Ulua. The stream we crossed on a flat-bottomed ferry boat, propelled by ropes and current. On the other bank we took a train, operated by a different banana company, and rode through still more fields of bananas, past plantations of light green sugar cane, and across pasture land whose trees were cut long ago.

The country on the west bank of the Ulua is much drier than the Tela region. There appear here such trees as the Guanacaste or Ear-tree (*Enterolobium cyclocarpum*), Castaño (*Sterculia apetala*), *Cochlospermum vitifolium*, with its brilliant flowers like yellow roses, and the Coyol Palm (*Acrocomia mexicana*).

Soon after leaving the river we neared the high hills, which from here southward are clothed chiefly with Pines. It is probable that the Pines on the hills nearest the coast are Cuban Pine (*Pinus caribaea*), but those farther inland are mostly *P. oocarpa*.

The distribution of Pines in Central America deserves further and careful study. The genus ranges southward into Nicaragua, but does not reach Costa Rica, although Pines often are planted about fincas in the mountains of the latter country. In some places along the Atlantic coast of Central America, as in British Honduras, and in Nicaragua, near Cape Gracias a Dios, Pine trees come to the edge of the sea, and rise high above the rocks which jut into the ocean. In other places, as here in Honduras, they do not approach within fifty miles of salt water. Probably the distribution is explainable by soil conditions, for manifestly Pines will not grow in swamp lands, such as those in which bananas thrive.

As we went farther inland, toward the foothills, the evidently drier country recalled somewhat the plains along the Pacific coast in Guatemala and Salvador. At noon we reached the railroad terminal at Potrerillos, and after a brief lunch we were off again in a *camión*, a truck fitted out as a bus.

I have seen many atrocious roads in Central America, and some of the same sort in the United States, but never have I seen one so bad as this over which it was considered possible to operate automobiles. For mules it was passable, but for motor cars it was a problem. The road was a long succession—about thirty miles—of rock ledges, mud holes of uncertain depth, and streams to be forded, all of which at first were entertaining because of their novelty and variety, but they were repeated so persistently that they soon became merely monotonous and exasperating. I am told that automobiles never fail to make the run from Potrerillos, but that sometimes it requires three days to cover the

distance. We were more fortunate, since we had deliberately waited for the driest season of the year. Even at that, the road was all but impassable, and more than once we were brought to a stop by mudholes, or forced to detour through gates and pastures to avoid them. The car careened like a ship in a storm. Piercing shrieks and shrill appeals to heaven for protection, voiced by the women passengers, announced each deeper hole in the road, as we were tossed from side to side, like so many bales of goods.

Botanically speaking, the road is an entertaining one. For some distance beyond Potrerillos there is continued the vegetation that characterizes the lowlands, but the abundance of exposed rock, something almost unknown in Central American lowlands, permits the growth of certain plants which can not prosper in the coastal swamps. In swampy places here in the foothills there are dense thickets of a giant spiny Bamboo, *Guadua aculeata*, which is characteristic of the coasts of Guatemala and Honduras. In general appearance it resembles closely the common cultivated Bamboo (*Bambusa vulgaris*) of Central America, and it is quite as vigorous and majestic in its growth.

When the hills are reached, rapid changes are noticeable in the composition of the vegetation. Although it is still tropical, there begin to appear many species not seen farther coastward. The plant growth, also, is sparser than in the lowlands. The road winds through beautiful valleys and crosses picturesque streams. One of these, the Río Blanco, receives its name from the milky appearance of its current. The road crosses it just at the foot of a long succession of symmetrical cascades, so uniform as to suggest the result of human design. This river is famous for its erratic behavior. Several times in its course it disappears suddenly into the earth, to reappear farther on as a new stream, or to issue forth in a series of springs.

The road climbs rapidly over the rocky slopes as it continues, and soon it is among the Pines. Here the typical mountain vegetation begins to make its appearance, announced by such subtemperate plants as Blackberries, Salvias, Paroselas, and helianthoid Composites. The road runs for a short distance through this thin tall forest, with its dense undergrowth of herbaceous plants and low shrubs, but soon ends on the shore of Lake Yojoa.

This beautiful and isolated body of water, one of the famous scenic features of Honduras, compares favorably with the celebrated lakes of Guatemala and Salvador. Some forty miles long and less than half as wide, it is surrounded on all sides by lofty, heavily forested mountains, whose sides remain untouched by man.

Our crossing of the lake by motor launch was uneventful on this occasion, although more thrilling on the return passage. The aquatic vegetation of this body of water is exceedingly luxuriant, and would well repay any botanist who would brave the mosquitoes to investigate

it. In places there are great floating masses, loosely anchored along the shores, composed of a variety of grasses, sedges, and other plants. I am informed on good authority that the American lotus (*Nelumbo lutea*) grows in this lake, but I did not see it, although there was an abundance of *Nymphaea* and *Brasenia*. One of the conspicuous trees of the borders of the marshes is the Pito (*Erythrina glauca*), covered at this season of the year with its gay orange blossoms.

We reached the opposite end of the lake and landed about dusk at a small group of huts called Pito Solo. Immediately we took an automobile for the remainder of our trip, over the mountains to Siguatepeque.

This portion of the day's journey was made in darkness, of course, but on the return trip the plant life was observed closely. On the north side of the mountains, where there is plentiful moisture, there is a curious mixture of Pines and obviously temperate plants with others, such as Aroids, which are essentially tropical. In one place I saw growing for the first time that curious Acanthaceous genus, *Louteridium*.

That night we drove serenely up the mountain side, quite unaware of the spectacular nature of the road we were following. From Lake Yojoa to the Pacific coast there is an excellent gravel highway, constructed by Honduran engineers, and there are in its course many hairpin curves above precipitous slopes that one can pass with greater complacency when they are obscured by darkness than when they are in open view.

It was a beautiful clear starry night, rather too chilly for comfort, as is commonly the case in the Central American highlands. There were few settlements along the road, but now and then we had a flashing glimpse of kitchens lighted by hearth fires, with white-clad people gathered about the smoky flames. From the mountains overhanging Siguatepeque, after passing the divide, we could scarcely make out the town, for its electric light plant was not in operation. About nine o'clock, however, we were jolted over cobblestones, and realized by this universal Central American signal that we had left the countryside and had arrived in a settlement.

I spent two weeks collecting about Siguatepeque, and enjoyed every bit of the time. Enjoyment was heightened by the clean and exceedingly comfortable little hotel, managed so competently by Don José Membreño, the most delightful place of the sort in all Central America in which it has been my privilege to be received as a guest. It stands on one side of the grass-grown plaza which surrounds the dazzlingly white parish church. The patio or courtyard of the hotel is a lovely garden, planted with orange, peach, and pear trees, and fragrant with a profusion of flowers, among which a gardener putters all day long. Its quiet is broken only by the occasional ringing of the church bells, and the quarreling of a couple of red and yellow guaras or macaws, calling to each other in endearing and honeyed terms, while doing their



best to peck out each other's eyes, or tearing out the weathered red roof tiles.

Before returning to the north coast, we made the trip by automobile to Tegucigalpa, which lies only 60 miles from the Pacific and the picturesque port of Amapala, where I collected plants seven years earlier. The road to the capital, although too long and tedious, from the standpoint of transportation, and too often disagreeably dusty, is nevertheless fascinating to a botanist. For most of its length it runs through the somewhat monotonous Pine-clad mountains, climbing laboriously to a crest, then descending precipitously down another slope. One of its most impressive vistas is that across the wide valley of Comayagua, shortly beyond Siguatepeque. Never shall I forget that early morning breakfast at Sambrano, high in the Pine forests, just before the valley was reached. How cold it was just after daybreak, and how pure and bracing the air, like that of our own Rocky Mountains.

The Comayagua Valley is perhaps 50 miles across, and shut in by high hazy mountains on every side. These mountains bar the rain clouds, and the valley receives but scant rainfall—none at all, of course, during the winter, or dry season. Its general aspect is parched, and one is reminded inevitably of the famous and larger Zacapa Desert of northern Guatemala, or of the arid areas along the Pacific coast of Guatemala, and Salvador. There is the same scrubby thorn forest, of Leguminosae and other shrubs and small trees, many of which shed their leaves when the rains cease. There is little herbaceous vegetation in evidence during the dry period, although doubtless there is enough when the rains are falling almost daily, in midsummer. There are many steep exposed slopes and rocks, decorated with a stately Agave, one of the handsomest of the genus that I have ever seen. Its compact bluish clusters of neat spiny leaves form a fitting pedestal for the sturdy flower stalks and their ample panicles of yellow flowers. There are *Furcraeas*, too, and such a profusion of Cactuses as one finds only in Mexico, or about Zacapa in Guatemala. The arborescent forms are not so varied, but there is one columnar *Cereus* of the subgenus *Cephalocereus*, whose few thick branches are topped with straggling masses of long white hair. Still more imposing are the tree *Opuntias*, some of which are symmetrical trees 20 to 30 feet high, with clean trunks and dense rounded crowns of large pads. Low *Opuntias* grow over the plains, and there are various other Cactuses, particularly a large *Echinocactus* of the barrel cactus type.

Here and there through the brushland trees were coming into bloom at the time of our visit. Vines of the Bignoniaceae were draped in purple festoons over low trees, and blue *Petrea* supplied a welcome dash of color. The *Tabebuias* presented vivid masses of blossoms above the withered leaves. The rose and purple of the Macuelizo (*Tabebuia pentaphylla*), one of the finest of all Central American trees, were more

conspicuous than anything else, and its relative, the Cortez (*T. chrysantha*), was equally brilliant in yellow. Madre de Cacao (*Gliricidia sepium*) trees, despite their pink flowers, recalled our Black Locust, a very close relative. Bullhorn Acacias grew here and there, with the giant Sandbox (*Hura crepitans*), whose milky sap is one of the local fish poisons. Fantastic Calabash trees (*Crescentia Cujele*) with pumpkin-like fruits were neighbors of most of the dwellings, and a few Lignumvitae (*Guaiaacum*) trees were visible beyond the sleepy old town of Comayagua, once the capital of Honduras. Not the least conspicuous tree of the hillsides was the Tree Morning-glory (*Ipomoea arborescens*), with its smooth chalky bark and milk-white trumpets.

Toward Tegucigalpa there were more pine- and oak-forested hills, like those about Siguatepeque, alternating with valleys almost but not quite so arid as the desert of Comayagua. Although the Agave which I mentioned is widely distributed, I did not see any considerable number of Cactuses except about Comayagua.

The vegetation about the capital I could not investigate for lack of time, but from the road it appeared sparse and rather uninteresting. The city itself lies in a picturesque but not very agreeable site, almost in a pit, shut in by bleak mountains.

But to return to Siguatepeque, where I spent but too few days, considering the comfort and the rich collecting to be found there. The list here presented of the woody plants observed about Siguatepeque, now that I have compiled it, seems rather common-place, but the plants did not seem so when I saw them growing. I am sure that the list can be amplified substantially by further exploration extended over a somewhat wider area, especially if carried on during the rainy season. It must be remembered that in the Pine regions the great majority of species are herbaceous plants, especially Grasses and Sedges, and of these I collected a large number, including innumerable interesting forms.

Siguatepeque lies in a wide valley, at an elevation of about 1,100 meters, encircled on every side by fairly or very steep mountains, some of which must rise to 2,700 meters. The highest mountains, unfortunately, I did not have time to explore. They are so difficult of access that more than the two weeks I had available would be necessary to get any comprehensive idea of the nature of their vegetation.

The valley is quite typical of what I saw elsewhere in central Honduras. Its soil is pitifully sterile, a stiff clay which pulverizes into suffocating dust along the more traveled roads. There is a general belief elsewhere in Central America that Honduras is a rich but undeveloped agricultural region, awaiting only colonists to become a center of coffee production. No doubt there are parts of Honduras which have rich agricultural possibilities, but the country which I saw certainly will not produce coffee, and I do not believe that the most of it will ever be useful except for grazing, and not too good for that.

The Siguatepeque basin is watered well enough, by superlatively meandering streams which reappear in such unexpected directions that one can scarcely believe it when told that this is the same stream crossed previously in some distant part of the valley. The valley floor is a wide plain, with a thick growth of grass, on which the neighborhood cattle and horses pasture. Everywhere through the grass there springs up during the rainy season such a bewildering variety of tiny herbaceous plants that it seems impossible to exhaust them. I was reminded of the similar savannas which stretch beyond Panama City, and yield upon every visit some addition to their recorded flora.

Here and there over the plains are low boggy places, which in wet weather must be a true paradise for a patient botanist. Along the streams, some of which run over ledges of white stone, are narrow thickets of shrubbery and small trees, yielding a large number of species, some of them abundant and others represented only by one individual here and another far away. On the grassy plains there are only a few spiny bushes, principally *Acacias*. All this valley must have been modified greatly by cultivation and settlement, but how much, it is impossible to decide. Probably it was covered once with Pine and Oak trees, but this is by no means certain. In some localities there are low thickets of scrub Oaks, like similar growths in New Mexico, or in the Ozarks.

The mountain sides above Siguatepeque are the most interesting portion of the region. Even the lower slopes are still forested with Pine, for although some trees have been cut, there is only a small local demand for the timber, and no reason for cutting the trees.

The general appearance of these Pine forests is homelike to one who knows the Yellow Pine forests of the southern Rockies, in Colorado and New Mexico. The pines look just the same, also the undergrowth, consisting chiefly of low wiry grasses of the same genera which grow in New Mexico, with a generous admixture of showy-flowered herbaceous plants not very different from those of the Rockies. *Salvias* and *Cupheas*, and yellow-flowered composites, similar to *Rudbeckias* and *Sunflowers*, are most abundant. The superficial resemblance is heightened still further by colonies of Bracken (*Pteridium*), of a species different from the New Mexican one but still identical in aspect.

Small swift streams run down the slopes, and the dense thickets fringing them resemble the Rocky Mountain Alder thickets, although the genera represented are unknown in the United States, at least for the most part. Along the stream banks there are a few Orchids, of tropical rather than temperate types, and with them Ferns which would certainly be out of place in the United States. One of them is a stemless tree fern whose leaf bases are covered with thick wads of brown scales, like felt. These soft scales, or lana, are used everywhere in the region for stuffing pillows, and they make a satisfactory substitute, as I learned from experience.



The higher one goes in the mountains, the more interesting the vegetation becomes. I rode one day up toward the summit with a man who knew the region well. It was delightful to ride along the easy slopes, over a carpet of grass and pine needles liberally sprinkled with pretty flowers. The country was so open that it was not necessary to follow a road or trail, but only to know the objective of one's excursion.

We arrived about noon at a hut high up in the forest, where the vegetation was quite different from what I had seen lower down about Siguatepeque. Along the way the increasing abundance of Ferns, Orchids, and gaudy Bromeliads on the oak trees had proved that we were approaching an area of greater moisture than prevails about the town in the valley. We received tangible proof of the moisture in a mild rainstorm which overtook us before we reached our goal.

At this high altitude most of the trees were Pines, but another species (*Pinus pseudostrobus*) had made its appearance, a graceful tree with drooping leaves and branches, which did not look at all like the yellow Pine of the Rockies. There was a much denser undergrowth, and almost as many broad-leaved trees as Pines. Here at El Achote I saw for the first time an abundance of Liquidambar, a tree of almost unprecedented distribution among American species. It appeared quite familiar, although perhaps taller and more slender than it usually grows in the United States. With it grew *Ostrya*, and the Central American Elm (*Chaetoptelea mexicana*), but most of the other trees were evidently tropical or subtropical. The temperate element was represented also among the herbaceous plants, for in a small bog near our stopping place grew both the Royal and Cinnamon Ferns. The Royal Fern I had seen previously in Costa Rica, in a similar situation, and here in Honduras was one of its Costa Rican associates, the red-flowered terrestrial *Epidendrum radicans*, the commonest Orchid of Central Costa Rica, which I had never found elsewhere in Central America.

As these high mountains are viewed from Siguatepeque, there appears a wide belt of deep green near their summits, above the more vivid green of the Pines. I am informed that this zone consists of hardwood trees, and if this is true, there is little doubt that a rich harvest of new and rare species will be made by the botanist who visits it first.

The list of woody plants here published is probably typical of the ligneous flora of many similar regions of like altitude through central Honduras, Guatemala, and Nicaragua. Such Pine forests as these do not possess so rich a flora as the wet tropical belts, but they do yield a great deal to reward exploration. They are little known, and they are comfortable and healthful regions in which to work. The climate of Siguatepeque is a delightful one, as pleasant as that of Cartago in Costa Rica, although Cartago's elevation is substantially greater.

The species listed on the following pages are of diverse origin. On the whole, the Siguatepeque flora seems to be related closely to that of

the mountains of southern and central Mexico. There is very little to remind one of Costa Rica or Panama, principally because those countries have no Pine trees, and ordinarily but little grassland. The region did not remind me greatly, either, of nearby Salvador, although northern Salvador, along the Honduran border, must have a very similar flora, as indicated by collections made there recently by Dr. Salvador Calderón.

#### PINACEAE

*Pinus oocarpa* Schiede. PINO OCOTE. The common Pine of the mountains of central Honduras, covering all the lower slopes of the mountains in the vicinity of Siguatepeque. In the Tela region Pines do not reach the coast, as they do in some parts of Central America, and they are not seen until one travels 50 miles inland. From that point all the way along the automobile road to Tegucigalpa, except for the hot Comayagua Valley, they are the dominating tree.

In their general appearance the forests of *Pinus oocarpa* are almost exactly like the Yellow Pine forests of the Rocky Mountains. But little of the available timber is utilized because of lack of transportation facilities. For local building purposes other materials, especially adobes, are preferred to wooden construction. About Siguatepeque I saw men sawing out pine boards by hand, the logs supported upon a stage and the saw operated by two men, one above and one below the log. Turpentine is sometimes collected in small amounts, but it has not proved to be a profitable industry.

*Pinus pseudostrobus* Lindl. PINAVETE. A large tree with drooping needles. Abundant at higher altitudes, as about El Achote, associated with numerous hardwood trees.

*Cupressus Benthamii* Endl. CIPRÉS. This Cypress is planted here for shade, as it is throughout Central America, especially in Guatemala City. It is native in Mexico and perhaps also in Guatemala.

#### GRAMINEAE

*Bambusa vulgaris* Schrad., var. BAMBÚ. The form of this Asiatic plant with yellow stems is planted frequently. The trunks are used for poles and for various other purposes.

#### PALMACEAE

*Chamaedorea* sp. A small Palm, the slender reedlike stems about 1 m. high; growing in a thicket along a stream near Siguatepeque. The species represented is near *C. pacaya* Oerst., but I have been unable to determine it more accurately.

*Cocos nucifera* L. COCO. A few coconut palms are planted about Siguatepeque, but although they have attained a fair size, they have never flowered.

*Acrocomia mexicana* Karw. COYOL. A few trees are planted in the

vicinity. The tree grows wild only at lower altitudes than that of the Siguatepeque Valley.

*Phoenix dactylifera* L. DÁTIL. A few Date Palms are planted, and have grown well. They flower but the fruits do not mature properly. Date Palms are seldom seen in Central America, although they might be expected to thrive in the drier regions.

A fan palm called "Suyate" is planted occasionally about Siguatepeque, but no specimens of it were obtained, and its identity is uncertain.

#### LILIACEAE

*Yucca elephantipes* Regel. IZOTE. This handsome arborescent Yucca is planted here, as it is almost throughout Central America. It is not native in the region, but probably was brought long ago from Mexico. The young flowers are cooked and eaten, and form a very palatable vegetable.

*Smilax tomentosa* HBK. A small unarmed vine, in thickets along streams.

#### PIPERACEAE

*Piper achoteanum* Trel. in Jour. Washington Acad. Sci. 19: 328 (1929). Type collected in a wet thicket in Pine forest at El Achote, no. 56125. A shrub 2-3 m. high, with nearly sessile, narrow, very rough leaves.

*Piper alveolatifolium* Trel. in Jour. Washington Acad. Sci. 19: 329 (1929). Type collected in a thicket along a stream near Siguatepeque, no. 56344. A shrub 3 m. high. The very handsome leaves are notable for their closely reticulate veins, and, as Pipers go, the species is an exceptionally well-marked one.

*Piper indignum* Trel. in Jour. Washington Acad. Sci. 19: 333 (1929). Type collected in a moist thicket near Siguatepeque, no. 55990. A dense shrub 1.5 m. high with densely pubescent leaves.

*Piper nonconformans* Trel. in Jour. Washington Acad. Sci. 19: 334 (1929). Type collected in Pine forest near Siguatepeque, no. 55906. A shrub of 2 m.

*Piper umbellatum* L. Plants shrubby or almost wholly herbaceous, commonly about a meter high; frequent in thickets.

#### SALICACEAE

*Salix chilensis* Mol. SAUCE. A medium-sized tree, frequent along streams. It grows also in the lowlands at sea level. This is the only native American species of *Salix* growing south of Guatemala.

#### MYRICACEAE

*Myrica mexicana* Willd. CERA VEGETAL. Common in thickets and along streams. A tree 4.5-6 meters high. This species is common in many of the Central American mountains, and in some regions the wax separated from the fruits by boiling is used for making candles and other articles.



## BETULACEAE

*Ostrya virginiana* var. *guatemalensis* (Winkl.) Macbride. A large or medium-sized tree, growing in the higher mountains, apparently rather common. This is probably about the southern limit of the range of the hop hornbeam.

## FAGACEAE

*Quercus comayaguana* Trelease, sp. nov.<sup>1</sup> (§ *Erythrobalanus*, *Aristatae*).

Twigs moderate (3–4 mm.), fluted, matted-gray-tomentose or lanate, reddish if abraded young; leaves (evergreen?) lanceolate-oblancoelate, acute, subaristate from the midrib, cordulate, moderate (4–5 x 12–15 cm.), slightly glossy; veins about 12 x 2, forking and looped; petiole tomentulose or glabrous; inflorescence and fruit unknown.

HONDURAS: a small tree in thicket along stream, Siguatepeque, Dept. Comayagua, alt. 1,100 m., *Paul C. Standley*, no. 56229, February, 1928 (Herb. Field Mus. No. 581,423, type); also no. 56364, from the same locality.—WM. TRELEASE.

A small tree, seldom more than 9 m. high, common along streams about Siguatepeque. The evergreen leaves are narrow and entire or nearly so.

*Quercus hondurensis* Trel. ENCINO. A tree 6–12 m. high, common on the pine-clad hills about El Achote. The branches are often heavily covered with Ferns, Bromeliads, Orchids, and other epiphytes. The type of this species was collected in the region of San Pedro Sula.

*Quercus segoviensis* Liebm. ROBLE. A shrub or tree 2–9 m. high, abundant on the plains and lower hills about Siguatepeque, usually associated with Pines. Often forming large dense thickets on the plains, with most of the plants mere shrubs 1–2 m. high.

*Quercus siguatepequeana* Trelease, sp. nov.<sup>2</sup> (§ *Erythrobalanus*, *Aristatae*).

Twigs rather slender (2–4 mm.), fluted, glabrous, quickly dull gray, with inconspicuous concolorous lenticels; buds brown, glabrous, finally glossy, suboblong, obtuse, appressed; leaves persistent, subelliptic to spatulate-oblong, very obtuse, rounded at the base or subcordulate, entire, somewhat crisped, narrowly callous-revolute, moderate (3–4 x 10–16 cm.), rather glossy, glabrous; veins 8–12 x 2, forking and looped; petiole glabrous, reddish, 2 x 5 mm.; inflorescence and fruit unknown.

HONDURAS: in thicket along stream, a tree of 9 m., Siguatepeque, Dept. Comayagua, alt. 1,100 m., *Paul C. Standley*, no. 56393, February, 1928 (Herb. Field Mus. no. 581,663, type); El Achote, at 1,500 m., *Paul C. Standley*, no. 56179.—WM. TRELEASE.

<sup>1</sup> *Quercus comayaguana* Trelease, sp. nov.

Ramuli griseo-tomentosi vel lanati; folia lanceolato-oblancoelata, acuta, basi cordulata, mediocria, sublucida, petiolo tomentuloso vel glabro; inflorescentia ut fructus ignota.

<sup>2</sup> *Quercus siguatepequeana* Trelease, sp. nov.

Ramuli graciles glabri, cito grisei, lenticellis inconspicuis concoloribus; folia persistentia, subelliptica vel spatulato-oblonga, obtusissima, basi rotundata vel subcordulata, integra, subcrispata, anguste callosa-revoluta, sublucida, glabra, petiolo glabro; inflorescentia ut fructus ignota.

A tree about 9 m. high, common about Siguatepeque and El Achote and known as Encino. The bark of this and other Oaks is employed locally for tanning skins.

#### ULMACEAE

*Chaetoptelea mexicana* Liebm. MORA. A medium-sized or large tree, growing in the wet zone of the higher mountains. Although *Chaetoptelea* is referred by some writers to *Ulmus*, it seems to me to have fairly good distinctive characters in the fruit. In habit it is not very like our northern Elms, and it occurs well outside the range of the genus *Ulmus* proper. I am somewhat skeptical regarding the vernacular name cited, which usually is given to trees of the Mulberry Family, especially to the Fustic (*Chlorophora tinctoria*).

#### MORACEAE

*Castilla elastica* Cerv. ULE, HULE. A few trees are planted about the fincas around Siguatepeque. The tree is native in the forests at lower altitudes, where it is tapped for its rubber.

*Morus multicaulis* Perr. MORERA. A good many small trees of this Mulberry have been planted about Siguatepeque, with the intention of using the leaves as food for silkworms.

*Ficus inamoena* Standl. A small tree in pine forest; known previously only from Guatemala. A well-marked species with densely pubescent leaves. A pine forest is a most unusual habit for a Fig, most of the species growing at low altitudes in wet forests.

*Ficus involuta* (Liebm.) Miq. HIGO. A tree 6-9 m. high, in pine forest. The species is widely distributed in Central America, and grows along the north coast of Honduras at sea level.

*Ficus padifolia* HBK. A tree 9 m. high, growing along a stream; fruit green, spotted with dark red. Probably the most common and certainly one of the handsomest of the Central American Figs.

*Ficus velutina* Willd. A tree 9 m. high, not found in fruit; growing at the edge of a stream and spreading over the water.

*Ficus radula* Willd. HIGO. A tree of 10 m., in moist thickets. One of the common and widely distributed species of Central America, often growing at sea level.

*Ficus Carica* L. HIGO. The Old World Fig is planted in various places about Siguatepeque, and seems to thrive. It is little grown in most parts of Central America, although it flourishes in the drier regions of Mexico. At Siguatepeque I sampled dried figs of good quality which had been prepared by a local resident.

#### PROTEACEAE

*Grevillea robusta* Cunn. GRAVILEA. The Australian Silk-oak is planted here as well as in most of the upland Central American towns. Although it is far from handsome, as it usually grows, it seems to be a great favorite for planting in parks and streets.

## AMARANTHACEAE

*Iresine Calea* (Ibáñez) Standl. A shrub of 1-1.5 m., frequent in moist thickets.

## RANUNCULACEAE

*Clematis grossa* Benth. A large vine, running over shrubs in thickets along the river.

## ANNONACEAE

*Annona Cherimola* Mill. ANONA. A shrub or small tree, rarely exceeding 7.5 m. in height, with greenish flowers. It is planted for its edible fruit, and it also grows wild in thickets about Siguatepeque.

*Sapranthus microcarpus* (Donn. Smith) R. E. Fries. A tree 6 m. high with small brown-red flowers. The species occurs in Salvador, and extends northward to southern Mexico. In the former country it is known by the names "Palanco" and "Chuffe."

## MONIMIACEAE

*Siparuna nicaraguensis* Hemsl. A shrub about 3 m. high, with green flowers, growing in wet thickets. The crushed leaves have a strong and characteristic, somewhat aromatic odor.

## LAURACEAE

*Persea americana* Mill. AGUACATE. The Avocado is grown commonly in the vicinity of Siguatepeque, as it is in nearly all parts of Central America.

*Phoebe helicterifolia* Mez. A slender tree 4.5-7.5 m. high with softly pubescent leaves; flowers greenish white; fruit black, the cup red. Frequent in thickets about Siguatepeque and at El Achote.

*Phoebe mexicana* Meissn.? A tree 9 m. high, in thicket along stream. Only sterile material was obtainable, and the specific determination is very uncertain.

## HAMAMELIDACEAE

*Liquidambar Styraciflua* L. LIQUIDÁMBAR. A tree 6-15 m. high, with narrow open crown. Common in Pine forest on the upper slopes above Siguatepeque and about El Achote. It is highly remarkable that this well-known tree, the Red Gum or Sweet Gum of the United States, should occur so abundantly in Honduras, although it occurs in the mountains of Mexico and Guatemala. Probably it reaches the southern limit of its range in the Pine-clad mountains of Honduras, but it may well be that it grows also in the unexplored mountains of Northern Nicaragua.

The tree is well known in Honduras by the name "Liquidámbar," and the balsam obtained from the trunk is highly esteemed for various medicinal purposes. During the European War the balsam was gathered in large amounts for export. For an extended account of its use in Honduras and elsewhere in tropical America see Contr. U. S. Nat. Herb. 23: 317 (1922).



As it grows on the hills above Siguatepeque, the Sweet Gum looks much as it does in the United States, although the Honduran trees seem to be somewhat taller and narrower than is usual in the North. The trees are scattered irregularly among the Pines, especially near the banks of streams. When one has once become acquainted with them, they may be recognized at a long distance because of their vivid green tint, much livelier than that of most other trees of the region.

#### ROSACEAE

*Rubus miser* Liebm. MORA. A shrub 1-2 m. high, with white flowers; common in open pine forest. Both this and the next species are frequent on the hills about Siguatepeque, and through central Honduras. The fruit is rather sour, but quite as good as the average of the wild Blackberries of the United States. It is gathered commonly and used for the preparation of jelly and preserves.

*Rubus trichomallus* Cham. & Schlecht. MORA. A shrub of 2 m., with sour purple-black fruit; usually in thickets along streams.

*Spiraea cantoniensis* var. *lanceata* Zabel. BUQUET DE NOVIA. Planted commonly for ornament. One of the common ornamental shrubs of Central America.

*Rosa* spp. Roses thrive at Siguatepeque, as they do everywhere in the mountains of Central America. They are grown abundantly also in the lowlands.

*Cydonia oblonga* Mill. MEMBRILLO. There are several small plantations of Quinces in the region. The fruit is highly esteemed for making marmalade.

*Eriobotrya japonica* Lindl. NISPERO JAPONÉS. The Loquat is planted occasionally for its well-flavored fruit.

*Pyrus communis* L. PERA. Several small Pear trees are growing in the patio of the hotel at Siguatepeque. I am informed that trees in the vicinity sometimes mature fruit, but that it is small and of inferior quality.

*Licania platypus* (Hemsl.) Fritsch. SUNZAPOTE. A fine handsome tall tree, planted occasionally. Native at lower altitudes. The large fruits are edible, but of poor quality.

*Prunus Persica* (L.) Batsch. DURAZNO. Peaches are planted frequently in the mountains of central Honduras, and fruits of good size sometimes are produced.

#### KRAMERIACEAE

*Krameria cuspidata* Presl. A densely branched, small shrub 60 cm. high or less, frequent on the plains about Siguatepeque. Apparently, the species has not been reported previously from Central America, but it is frequent in southern Mexico.

## LEGUMINOSAE

*Inga edulis* Mart. GUAMA. A tree 4.5–7.5 m. high with dense rounded crown; frequent in thickets. The long white stamens make the flower heads showy. The white pulp surrounding the seeds is edible.

*Mimosa albida* H. & B. ZARZA. A shrub 1–1.5 m. high, armed with sharp prickles. Common in open pine forest.

*Mimosa pigra* L. A shrub 1–2 m. high, often forming dense thickets about boggy places on the plains.

*Mimosa hondurana* Britton. A large woody vine armed with closely set, recurved prickles which cling to every passing object and tear the skin painfully; pods dark red. The species was based upon material collected in the Lancetilla Valley, at sea level.

*Acacia Farnesiana* (L.) Willd. ESPINO. A shrub 1–2.5 m. high with whitish spines. Frequent on the dry plains about Siguatepeque.

*Acacia Hindsii* Benth. BULLHORN ACACIA. A shrub or tree 2–5.5 m. high, armed with large inflated spines. The spines, as in all the bullhorn Acacias, are inhabited by savage ants, which bite most painfully.

*Acacia Milleriana* Standley, nom. nov. (*Mimosa campechiana* Miller, Gard. Dict. ed. 8. *Mimosa* no. 20 [1768].—*Poponax campechiana* Britton & Rose in N. Amer. Fl. 23: 90 [1928].—Not *Acacia campecheana* Schenck, 1913). ESPINO RUCO. A tree 4.5–9 m. high, armed with long stout spines; crown broad and spreading. Abundant on the dry plains about Siguatepeque. The trees are very distinct in their habit and appearance, and they are recognizable at a long distance.

The genus *Poponax* Raf. is recognized as distinct by Britton and Rose in their recent cactusization of the Mimoseae, but there is no apparent reason why this or probably any of the other segregates should be separated from the long-established unit *Acacia*. In all, eleven segregates from *Acacia* are described in the third part of volume 23 of the North American Flora, and many of them stand upon quite as trivial characters as the cactus segregates proposed by the same authors. The genera *Poponax* and *Fishlockia*, for instance, are separated in the key to genera as follows:

Pinnae few to many pairs; leaflets narrow, small, numerous. . . . . *Poponax*.  
Pinnae 1 pair; leaflets 1 or 2 pairs, broad, coriaceous. . . . . *Fishlockia*.

If these are generic characters, there is no reason why each species of plant should not have its own particular genus.

*Acacia salvadorensis* (Britt. & Rose) Standley, comb. nov. (*Acaciella salvadorensis* Britton & Rose in N. Amer. Fl. 23: 101 [1928]). A tree 6 m. high, growing in a dry field.

I am transferring this plant to *Acacia*, not because I have any reason to believe that the species is a good one, but merely for convenience. In *Acaciella* Britton and Rose recognize 49 species, mostly forms which a few years ago would have been referred to three or four long-established

species. It is certain that some of the segregates represent valid species, but which really deserve nomenclatural recognition can be determined only after a thorough study of the specimens involved. It is to be feared that this group of the genus *Acacia* is approaching the condition hinted in the last edition of Bailey's *Cyclopædia of Horticulture*: One contributor to that work makes the statement that "the genus consists of 14 specimens," a remark probably truer than he suspected.

*Calliandra centralis* (Britt. & Rose) Standley, comb. nov. (*Anneslia centralis* Britton & Rose in N. Amer. Fl. 23: 52 [1928]). A shrub 1 m. high or less, the heads showy because of the abundant bright purple-red stamens. The type was collected at San Pedro Sula, Honduras.

*Calliandra lucens* (Britton) Standley, comb. nov. (*Anneslia lucens* Britton in N. Am. Fl. 23: 194 [1928]). A shrub 1-2 m. high, noteworthy for its very thick and shining, small leaflets; stamens purple-red and showy. Frequent in open pine forest. Type, No. 56397, from Siguatopeque. The species is reported also from Guatemala.

*Parkinsonia aculeata* L. A handsome yellow-flowered shrub, planted in the garden of the church. I noted it as frequent in the Comayagua Valley, and it is naturalized in many parts of Central America.

*Cassia grandis* L. CARAO. A fine large tree, its dense masses of blossoms strongly suggesting those of apple blossoms. Probably not native in this region, but a few trees were noted about the town.

*Parosela psoraleoides* (Moric.) Rose. A shrub a meter high with inconspicuous pinkish flowers. Growing in dry thickets.

*Parosela vulneraria* (Oerst.) Rydb. A shrub 1-2 m. high, very slender and much branched, frequent in dry thickets and open pine forest. Flowers varying from whitish or cream-colored to red-purple, according to the stage of development and withering.

*Diphyssa robinoides* Benth. A tree 6 m. high, in a thicket along a stream. The *Diphyssa* species are esteemed in Central America for their bright yellow wood of good quality.

*Benthamantha ochroleuca* (Jacq.) Alef. A shrub 1 m. high, the greenish white flowers tinged with red. In dry thickets. The leaflets are more numerous than described for this species by Rydberg (in N. Amer. Fl. 24: 244. 1924), and the form might be regarded as a distinct species, but in this genus of notoriously "weak" species, it does not seem desirable to introduce any additional names.

*Desmodium plicatum* Cham. & Schlecht. A slender shrub 2 m. high, frequent in pine woods; corolla dark purple.

*Erythrina rubrinervia* HBK. PITO. A tree 6-9 m. high with few thick branches and soft wood; petals bright red. One of the characteristic small trees of the Pacific slope of Central America, much planted for living fence posts. The young and tender flowers are cooked like string beans, and eaten here as everywhere else in Central America. The tree is a very showy one when in blossom.



*Rhynchosia longeracemosa* Mart. & Gal. A large vine with greenish yellow flowers; stems usually herbaceous but sometimes somewhat woody. The plant is scarcely to be classed as a shrub.

*Piscidia grandifolia* (Donn. Smith) I. M. Johnston. A tree 4.5-7.5 m. high, common in thickets about Siguatepeque.

*Lonchocarpus atropurpureus* Benth. CHAPERNO. A tree 9 m. high; in fruit. In moist thickets.

#### RUTACEAE

*Casimiroa tetrameria* Millsp. MATASANO. A tree 6-9 m. high, with dense rounded crown, the leaflets densely soft-pubescent. Growing in thickets along the river. This species bears a sweet watery edible fruit somewhat resembling a green apple.

*Citrus sinensis* (L.) Osbeck. NARANJA. Oranges of good quality are grown about Siguatepeque. I presume that the other usual citrus fruits of Central America, such as the lime, sour orange, citron, and sweet lime, are planted, but I have no notes regarding their occurrence.

*Murraya paniculata* (L.) Jack. Planted occasionally for ornament.

#### SIMAROUBACEAE

*Simarouba glauca* DC. ACEITUNO, NEGRITO. A large tree with edible black fruits which closely resemble olives. The fruits are of poor flavor and little esteemed. The bark is employed locally as a remedy for affections of the stomach and intestines, especially for dysentery. Oil obtained from the seeds is used in making soap and candles.

#### MELIACEAE

*Trichilia havanensis* Jacq. A densely branched tree 9 m. high with glossy leaves and small greenish flowers. Frequent in moist thickets. For the tree I was given the vernacular name "zopilote," but I suspect that this is an erroneous name. In some parts of Honduras it is called "limoncillo," an allusion to its fragrant foliage.

#### MALPIGHIACEAE

*Gaudichaudia Schiedeana* Juss. A small inconspicuous woody vine, growing in moist thickets.

*Stigmaphyllon ellipticum* (HBK.) Juss. A large slender woody vine with sulphur-yellow flowers; in thickets along streams.

*Byrsonima crassifolia* (L.) DC. NANCE. A large shrub or small tree with showy yellow flowers; frequent in dry thickets. The small fruits, with a flavor somewhat like that of green apples, are eaten chiefly by children.

#### EUPHORBIACEAE

*Croton ciliato-glandulosus* Ortega. CIEGA-OJO. A shrub about 1 m. high, frequent in moist thickets. The species occurs also near the coast slightly above sea level. The abundant gland-tipped hairs which fringe

the leaves and stipules adhere readily to the hands, and they are said to cause painful and dangerous inflammation of the eyes if in contact with them. So far as known, this distinctive species does not occur south of Honduras.

*Croton flavens* L. A stiff shrub 1-3 m. high, frequent along streams. There is some uncertainty regarding the specific determination, but the specimens agree well with material from Yucatan which has been referred here. The species is probably new to the Central American flora.

*Croton repens* Schlecht. A low shrub, seldom more than 40 cm. high, very common in pine forest and in open fields. Easily recognized among the Central American Crotons because of its small, broad, coarsely toothed leaves.

*Acalypha leptopoda* Muell. Arg., var. *mollis* Muell. Arg. A shrub or small tree 2.5-5.5 m. high, frequent in dry thickets.

*Acalypha macrostachya* Jacq. A shrub 3 m. high, in dry thickets. The species occurs also at sea level along the north coast.

*Acalypha porphyrantha*, sp. nov.

Frutex 0.6-1.2 m. altus, ramulis gracilibus, vetustioribus teretibus cinnamomeis rimosis et sparse pallido-lenticellatis, novellis dense pilis albis longis gracilibus patentibus pilosis, internodiis elongatis; stipulae ferrugineae, minutae, lanceolatae, 1-2 mm. longae, deciduae, minute adpresso-pilosulae; petioli graciles, 0.7-3.5 cm. longi, pilosi; lamina ovata vel late ovata, coriacea, 2.5-8 cm. longa, 1.3-4.5 cm. lata, longe acuminata, acumine angusto longe attenuato acuto vel obtuso, basi cordata vel interdum rotundata, supra viridis vel glauco-viridis, pilis longis albidis patentibus dense pilosa, interdum sublucida, costa nervisque prominulis, subtus viridis, praesertim ad nervos albido-hirsuta, basi 5-7-nervia, costa nervisque gracilibus elevatis, costa superne nervos ca. 5 utrinque emitte, nervulis vix prominulis arcte reticulatis, margine grosse serrato, serraturis acutis saepe salientibus. Flores monoici; spicae masculae ex axillis superioribus nascentes, fere sessiles, dense multiflorae, ca. 1.5 cm. longae et 2 mm. crassae; spicae femineae terminales 3-6 cm. longae, breviter pedunculatae, multiflorae, bracteis remotis sessilibus; styli ca. 3 mm. longi, purpureo-rubri, multilacinuligeri.

HONDURAS: in pine forest, Siguatepeque, Dept. Comayagua, alt. 1,100 m., *Paul C. Standley*, no. 56354, February, 1928 (Herb. Field Mus. no. 582,005, type). Also nos. 55841 and 55881 from the same locality.

In all the specimens collected the pistillate inflorescence is so immature that it is impossible to determine the nature of the pistillate bracts, which furnish the most important characters for distinguishing the species. The plant, however, can not be referred to any of the *Acalyphas* known from Central America. In foliage it suggests *A. leptopoda* Muell. Arg., but the inflorescence is altogether different. The species may be recognized by the small size of the plant and by the very thick, more or less lustrous leaves.

*Codiaeum variegatum* var. *pictum* Muell. Arg. LAUREL, LAUREL TIRABUZÓN, LAUREL FÚNEBRE, LAUREL COLA DE GALLO. The well-known tropical "crotons," with their gaudy variegated leaves, are planted for ornament in almost all Central American gardens. They seem to thrive quite as well in the mountains as in the lowlands.

*Euphorbia pulcherrima* Willd. PASCUA. The gorgeous poinsettias are one of the glories of Central American gardens. At Siguatopeque they were in full flower in February, but generally they are at their best about Christmas, hence their usual name of "Pascua," or "Christmas-flower."

*Jatropha aconitifolia* Mill. Planted frequently in hedges. A shrub or small tree.

#### ANACARDIACEAE

*Mangifera indica* L. MANGO. Planted abundantly. The favorite fruit of the Central American people.

*Mauria sessiliflora*, sp. nov.

Arbor 9-12-metralis, ramulis crassiusculis, novellis pilis minutis fulvis adpressis subdense indutis; folia plerumque 22-30 cm. longa, 6-10 cm. longe petiolata, petiolo gracili subtereti glabro; foliola 5-9, jugis 3-4 cm. distantibus, lateralibus 3-8 mm. longe petiolulatis, terminali 1-2 cm. longe petiolulato, anguste oblonga vel lanceolato-oblonga, 10-15 cm. longa, 3-4.5 cm. lata, coriacea, acuminata, acumine attenuato obtuso, basi acuta vel plerumque sensim attenuata, glabra, supra viridia vel glauco-viridia, sublucida, nervis vix prominulis, subtus pallidiora, costa crassiuscula elevata, nervis lateralibus gracilibus, prominentibus, arcuatis, angulo lato adscendentibus, nervulis prominulis arcte reticulatis. Paniculae axillares 10-12 cm. longae, foliis multo breviores, dense pilis brevibus fulvis subadpressis indutae, ramis infimis 1-1.5 cm. longis, superioribus brevioribus, floribus numerosis sessilibus in fasciculis parvis densis subcapitato-congestis, capitulis sessilibus, bracteis minutis triangularibus acutis; sepala rotundata glabra; petala ovalia, obtusa, 2-2.5 mm. longa, glabra, viridescencia; stamina petalis paullo breviora.

HONDURAS: in thicket along river near Siguatopeque, alt. 1,100 m., Paul C. Standley, no. 56062, February, 1928 (Herb. Field Mus. no. 581,919, type). Also no. 56431, from the same locality.

Closely related to *M. birringo* Tul., but in that species the panicles are usually broad and open, the flowers are pedicellate, and the leaflets not long-attenuate at the base.

*Rhus terebinthifolia* Schlecht. & Cham. A shrub 2 m. high, growing in pine forest near El Achote.

#### AQUIFOLIACEAE

*Ilex panamensis* Standl.? A tree 6 m. high, in thickets along streams. It is probable that this tree belongs to an undescribed species. It was possible to obtain only sterile material, and its foliage I can not dis-



tinguish from that of the recently described *I. panamensis*. The latter is a coastal plant, and it does not seem likely that it occurs also in the mountain region.

#### SAPINDACEAE

*Paullinia costaricensis* Radlk. A large woody vine, in thickets along streams.

*Serjania rhachiptera* Radlk. In thickets along streams. A large woody vine with handsome, much dissected leaves. The species occurs also in Guatemala and Salvador.

#### RHAMNACEAE

*Sageretia elegans* (HBK.) Brongn. A slender shrub 1.5–2.5 m. high, growing in moist thickets.

#### VITACEAE

*Vitis vinifera* L. UVA. European grapes are planted occasionally, but they do not thrive in Central America. The leaf-cutting ants seem to be particularly fond of their foliage.

#### TILIACEAE

*Triumfetta speciosa* Seem. A shrub 3 m. high; calyx red, shading above into yellowish. A rather handsome plant, in thickets along the river.

#### MALVACEAE

*Robinsonella divergens* Baker & Rose. In a thicket along a stream. A tree 6 m. high. Only one tree was found in this vicinity, and it was pointed out to me by the daughters of Don José Membreño, who had been greatly impressed by its beautiful showing of white flowers a week previously, and had recognized it as something unusual. The specimens differ somewhat from the typical form in having three broad, often obtuse or rounded, nearly entire lobes. All the species of *Robinsonella* are closely related, and this Honduran form does not seem sufficiently distinct from *R. divergens* to deserve nomenclatural recognition. These small trees are well worthy of cultivation because of their showy flowers, although, unfortunately, they persist only a short time upon the tree.

*Hibiscus mutabilis* L. VARIABLE. A shrub cultivated for ornament because of its large showy flowers, which change color rapidly after opening.

*Hibiscus Rosa-Sinensis* L. MAR PACÍFICO. The Chinese Hibiscus is one of the favorite garden shrubs.

*Hibiscus schizopetalus* (Mast.) Hook. VIUDA ALEGRE. Planted occasionally for ornament.

#### STERCULIACEAE

*Waltheria americana* L. A shrub 30–60 cm. high, or often only an herb, with yellow flowers. Frequent in pine forest. One of the common weeds of Central America.

## THEACEAE

*Ternstroemia tepezapote* Cham. & Schlecht. A scrubby tree about 6 m. high, with dense branches and thick leathery leaves; frequent in thickets along streams. Only sterile specimens were obtainable.

## HYPERICACEAE

*Hypericum denticulatum* HBK.? Plants stiffly erect, 30–90 cm. high, herbaceous or frequently somewhat woody, with fastigiate branches; petals yellow; common in pine forest. The specific determination is very doubtful.

*Vismia guianensis* (Aubl.) Pers. A shrub 3 m. high, growing in moist thickets.

## GUTTIFERAE

*Clusia Salvini* Donn. Smith. OREJA DE BURRO ("Donkey's ears"). A shrub or small tree, up to 6 m. high, with very thick, hard leaves and green globose fruit. In wet forest at El Achote.

## FLACOURTIACEAE

*Casearia sylvestris* Sw. A tree of 7.5 m., the small flowers pale green. Common in low thickets.

*Xylosma Hemsleyana* Standl. A shrub or tree 2.5–6 m. high, in moist thickets. Flowers greenish yellow. The genus is an interesting one because of the fact that the trunks are provided normally with large branched thorns, similar to those appearing on the Honey Locust (*Gleditsia triacanthos*).

## LYTHRACEAE

*Cuphea Hookeriana* Walp. A slender shrub a meter high, or often wholly herbaceous; calyx whitish, the rather showy petals black-purple. Growing about Siguatepeque and as high as El Achote, in open pine forest.

*Cuphea utriculosa* Koehne. A densely branched shrub about 60 cm. high, growing on rocks at the edges of streams. One of the common species of Central America, and found only along or in streams, with its roots in running water.

*Grislea secunda* Loeffl. A slender bushy shrub about 2 m. high with gland-dotted leaves and axillary, bright red flowers. This shrub was not noted about Siguatepeque, but it was seen on the north coast near Tela, and it was found to be abundant at one place along the road through the mountains above Tegucigalpa. The genus formerly was known only from northern South America, but it was discovered in Honduras three or four years ago by Professor Samuel J. Record. It is remarkable that it has not been found in the intervening countries, and if it does occur there it can scarcely escape attention, because its brilliant flowers make it conspicuous even when seen from a long distance. Its distribution is erratic, it would seem, even in Honduras.

Certainly it would be difficult to find in Central America two regions more unlike than those in which I have seen it; the low hot swamps of the banana country, and the high dry mountains of Central Honduras, where the climate is rather temperate than tropical.

#### PUNICACEAE

*Punica Granatum* L. GRANADA. The Pomegranate is planted rather commonly about Siguatepeque. It is seldom seen in most parts of Central America.

#### MYRTACEAE

##### *Calyptanthus hondurensis*, sp. nov.

Frutex vel arbor 3-6-metralis, ramis gracilibus rigidis teretibus cinereis, novellis angulatis glabris, internodiis brevibus vel elongatis; folia breviter petiolata, petiolo crasso 2-4 mm. longo glabro; lamina oblonga vel elliptico-oblonga, rarius oblongo-lanceolata, 4-6 cm. longa, 1-2 cm. lata, apicem versus angustata, obtusa, basi obtusa vel acutiuscula, subcoriacea, utrinque dense minuteque punctata, supra glauco-viridis, costa subimpressa, nervis obsolete, subtus pallida, glabra, costa gracili elevata, nervis lateralibus utroque latere circiter 9, prominulis, rectis, angulo acuto adscendentibus, prope marginem nervum distinctum collectivum efformantibus, marginibus saepe revolutis. Paniculae terminales fasciculatae, laxae pauciflorae, ca. 3 cm. longe pedunculatae, ramis oppositis vel verticillatis rigidis glabris, floribus sessilibus vel 1-2 mm. longe pedicellatis, plerumque ternis; calyx in alabastro ellipsoideus, 2-2.5 mm. longus, acutus, sparse et minute adpresso-pilosulus; caetera ignota.

HONDURAS: wet thicket, El Achote, near Siguatepeque, Dept. Comayagua, alt. 1,500 meters, *Paul C. Standley*, no. 56164, February 18, 1928, (Herb. Field Mus. no. 581,097, type); Siguatepeque, alt. 1,100 m., *P. C. Standley*, no. 55933.

A relative of *C. pendula* Berg, of southern Mexico, but in that the flowers are sessile and the petioles are longer.

Vernacular name, "Guayabillo."

*Eucalyptus* spp. Two species of this genus have been planted about Siguatepeque, but specimens of them were not collected. The trees are favorites in some parts of Central America because of their rapid growth.

##### *Eugenia Doubledayi*, sp. nov.

Frutex vel arbor 3-6-metralis, ramulis subgracilibus teretibus brunneis plus minusve rimosis minute sericeis vel fere omnino glabris, internodiis elongatis; petioli 10-15 mm. longi, fere glabri, crassiusculi, anguste sulcati; lamina elliptica, 6.5-12 cm. longa, 3.5-5.5 cm. lata, abrupte acuminata, acumine anguste triangulari obtuso, basi acuta, coriacea, opaca sed dense glanduloso-punctata, supra viridis, costa impressa, nervis obscuris, subtus pallida, statu juvenili sericea, cito glabrata, costa valida elevata, nervis lateralibus utroque latere circiter 12 promi-



nulis gracillimis angulo acuto adscendentibus fere rectis prope marginem irregulariter conjunctis, nervulis obsoletis. Inflorescentiae axillares, breviter racemosae, 5–8 mm. longe pedunculatae, plerumque triflorae, pedicellis 5–6 mm. longis minute puberulis; calycis lobi in apice baccae persistentes, rotundati, obtusi, 2.5–3 mm. longi, punctati, extus minute sericei; fructus oblongus vel obovoideo-oblongus, circiter 18 mm. longus et 6–7 mm. latus, 8-costatus, glaucescens et minute albido-sericeus vel glabratus, basin versus paullo angustatus, apice obtusus; semen 1, cylindricum, 12 mm. longum, 4 mm. diam., brunnescens, nigro-puncticulatum.

HONDURAS: in thicket along river, Siguatepeque, Dept. Comayagua, alt. 1,100 meters, *Paul C. Standley*, no. 56063, February, 1928 (Herb. Field Mus. no. 581,920, type), also no. 56190.

The species is not closely related to any other known from Central America. The leaves resemble those of *E. guatemalensis* Donn. Smith, but in that the fruit is much smaller and oval.

*Eugenia Doubledayi* is named for Louis Doubleday, who accompanied me on a visit to the interior of Honduras, and to whom I am indebted for a great deal of assistance in making the collections about Siguatepeque.

*Eugenia axillaris* (Sw.) Willd. A tree 4.5–7.5 m. high, common in thickets along streams.

*Eugenia guatemalensis* Donn. Smith. A shrub 1.5–3 m. high, in moist thickets. The species grows also along the north coast of Honduras at sea level.

*Eugenia Jambos* L. MANZANA. A large tree with exceptionally handsome foliage and with rather inconspicuous, greenish flowers. The edible fruit has the flavor of rose water, hence the common name of "rose-apple." The tree is planted generally in Central America for its shade and fruit, and about Siguatepeque it is naturalized everywhere, even well up in the mountains along the streams.

*Psidium molle* Bertol. GUAYABILLA, HUEVO DE GATO. Common, growing nearly everywhere, on plains, in open pine forest, and in moist thickets along streams. In drier places, where the soil is sterile, the plants are usually only 60–90 cm. high, but in moist places they attain the size of a small tree, about 5 m. high. The fruit is highly esteemed in the interior of Honduras, and it is certainly far superior in flavor to the common guava, being juicy and sweet, but somewhat acidulous. The species is widely distributed in Central America, at least on the Pacific slope.

*Psidium Oerstedianum* Berg. ARRAYANA. A low shrub, only 30–60 cm. high, in open pine forest; common. The fruits of this species, also, are considered very good to eat.

## MELASTOMACEAE

*Clidemia hirta* (L.) Don. SIRÍN. A bushy shrub 1 m. high; petals pinkish white. Frequent in open pine forest.

*Conostegia xalapensis* (Bonpl.) Don. SIRÍN. A frequent shrub 1.5–3 m. high, in pine forest. The most common member of the family in Central America. The species grows also at sea level on the north coast.

*Heterotrichum octonum* (H. & B.) DC. A shrub 2 m. high, in thickets along streams; petals white.

*Miconia albicans* Triana. SIRÍN, NEGRITO. A shrub 0.5–2 m. high, very common in open dry pine forest.

*Miconia globulifera* Naud. SIRÍN. A conspicuous shrub 1.5–2.5 m. high, common in moist thickets and in open pine forest.

*Miconia guatemalensis* Cogn. SIRINA. A shrub 1–1.5 m. high, in thickets about Siguatepeque and also in bogs at El Achote. Petals white, the fruit red-purple.

*Miconia mexicana* (H. & B.) Naud. SIRINA. A shrub 2 m. high with handsome white flowers; growing in pine forest about El Achote.

## ARALIACEAE

*Oreopanax Salvini* Hemsl. MANO DE LEÓN. A tree about 4.5 m. high with large, long-petioled, deeply lobed, coarsely stellate-pubescent leaves. I was told that the tough leaves are used for wrapping soap.

## CORNACEAE

*Cornus excelsa* HBK. A shrub or tree 2.5–5.5 m. high, frequent along streams about Siguatepeque, and collected also in wet thickets at El Achote.

## CLETHRACEAE

*Clethra hondurensis* Britton. A tree 4.5–7.5 m. high, growing in thickets along streams. Found in fruit only.

## ERICACEAE

*Andromeda mexicana* Hemsl. A tree 4.5–7.5 m. high, with rough gray bark. Growing in pine forest; usually very irregular in growth, and often much gnarled, especially in its favorite habitat, exposed rocky hilltops. The species has been collected recently in northern Salvador.

*Arbutus xalapensis* HBK. INDIO DESNUDO (“naked Indian”). A tree 4.5–6 m. high, in wet thickets high in the mountains. The thin bark peels off in papery sheets, leaving the smooth brown trunk, hence the vernacular name, which is given on the coast to *Bursera Simaruba*, in which the trunk has much the same appearance. The flowers are white and rather handsome.

## MYRSINACEAE

*Ardisia compressa* HBK. CAMACA. A shrub 1.5–2.5 m. high with white flowers. Frequent in moist thickets. The purple-black fruit is edible and of good flavor, but the flesh is very scant. This is one of the common shrubs of the Central American mountains.

*Rapanea ferruginea* (R. & P.) Mez. A tree 4.5–6 m. high, in pine forest at El Achote.

## SAPOTACEAE

*Calophyllum mammosum* (L.) Pierre. ZAPOTE. A tree about 12 m. high with spreading open crown. Cultivated commonly for its sweet fruit, and also naturalized in thickets along the river. I found the tree wild in primeval forest along the north coast of Honduras.

*Chrysophyllum mexicanum* Brandeg. CAIMITO. A tree 6 m. high, in thickets along the river. Similar in appearance to the common Star-apple (*C. Cainito*), but with much smaller fruits.

## LOGANIACEAE

*Buddleia americana* L. A shrub 1–2.5 m. high, with small yellow flowers. Frequent in moist thickets. One of the common weedy shrubs of Central America.

## APOCYNACEAE

*Echites microcalyx* A. DC. Common in moist thickets or in pine forest. A small, very slender, herbaceous or somewhat woody vine with handsome, bright yellow blossoms, the corolla having a brown or dark red throat.

*Tabernaemontana divaricata* (L.) R. Br. MAGNOLIA. A shrub with fragrant white flowers, planted for ornament. It would be interesting to know how the name "Magnolia" happens to be thus misapplied, but, if I remember correctly, it is given to the plant also in Nicaragua. It would be equally interesting to learn how the name "Sassafras," of North American Indian origin, happens to be applied in Central America to species of the genus *Croton*.

*Thevetia peruviana* (Pers.) K. Schum. CHILCA. A shrub or small tree with large, bright yellow flowers, sometimes planted for ornament.

## VERBENACEAE

*Lantana involucrata* L. PETATILLO. A shrub a meter high, with pink flowers; growing on dry plains.

*Lippia Kellermanii* Greenm. CUTUFUME. A tree 4.5–6 m. high; corollas pale yellow. In wet thickets high in the mountains.

*Lippia myriocephala* Schlecht & Cham. A tree about 12 m. high, with a trunk 25 cm. in diameter. Occasional in dry thickets. In Salvador boards are sometimes sawed from the trees.



## LABIATAE

*Hyptis asperifolia*, sp. nov.

Frutex 1-1.5-metralis, ramis gracilibus obtuse quadrangularibus, vetustioribus brunneis vel ochraceis, novellis ferrugineis scabris, internodiis brevibus; folia opposita, fere coriacea, petiolata, petiolo crassiusculo 2-14 mm. longo dense et brevissime villosulo vel scaberulo; lamina oblonga vel oblongo-ovata, pleraque 1-3 cm. longa et 0.8-2 cm. lata, interdum usque ad 8 cm. longa et 4 cm. lata, grosse crenata, apice obtusa vel fere rotundata, basi acuta vel acuminata, supra viridis, scabra, costa manifesta, nervis obsoletis, subtus pallidior, sparse vel dense ochraceo- vel griseo-tomentosa, tomento e pilis stellatis composito, costa gracili elevata, nervis lateralibus utroque latere circiter 6 prominentibus angulo acuto adscendentibus. Flores capitati, capitulis axillaribus dense multifloris plerisque 2-5 mm. longe pedunculatis vix 1 cm. diam., bracteis filiformibus calyce brevioribus; calyx 5-6 mm. longus, scaberulo-hispidulus, laciniis lineari-attenuatis tubo campanulato paullo brevioribus erectis; corolla pallide purpurea, circiter 1 cm. longa, extus sparse puberula, tubo gracili cylindrico, lobis 1.5-2 mm. longis; antherae breviter exsertae.

HONDURAS: in pine forest near Siguatepeque, Dept. Comayagua, alt. 1,200 m., *Paul C. Standley*, no. 56231, February 1928 (Herb. Field Mus. no. 581,425, type); in pine forest, El Achote, near Siguatepeque, 1,500 m., *P. C. Standley*, nos. 56095, 56180.

An isolated species, characterized by its shrubby habit, small thick leaves, stellate pubescence, and small short-peduncled axillary flower heads.

*Salvia siguatepequensis*, sp. nov.

Frutex 1-1.5-metralis ramosus, ramis crassis obtuse quadrangularibus vel subteretibus densissime brunneo-tomentosis, internodiis elongatis; folia opposita, petiolata, in sicco fere subcoriacea, oblonga vel ovato-oblonga, 9-17 cm. longa, 3-8 cm. lata, acuta vel acuminata, basi obtusa vel acuta, arcte dentibus obtusis serrato-dentata, supra viridis, tenuiter minuteque stellato-tomentella, subtus dense stellato-tomentosa, tomento cinereo vel pallide brunnescente, costa valida elevata, nervis lateralibus utroque latere circiter 8 prominentibus angulo acuto adscendentibus. Flores verticillati, verticillis paucifloris remotis vel approximatis, racemum laxum 4-10 cm. longum efformantibus, pedicellis 2-9 mm. longis ut rhachis pilis interdum viscidis simplicibus vel stellatis hispidulis; bractee caducae, oblongo-ovatae, circiter 18 mm. longae, apice longe filiformi-subulatae, dense stellato-tomentosae; calyx 1-1.5 cm. longus, anguste campanulatus, prominenter costatus, viridis, sparse glanduloso-pilosulus et ad nervos pilis brevibus basi dilatatis indutus, labiis subaequalibus anguste triangularibus longe filiformi-acuminatis, calyce in statu fructifero interdum recurvo; corolla coccinea, extus sparse villosa-pilosa, 2.5-2.8 cm. longa, tubo 5 mm. longo et 2 mm. lato, abrupte ampliato,

fauce 1.5 cm. longa et 8 mm. lata, labio superiore erecto circiter 8 mm. longo, inferiore brevior intus glabro; stamina inclusa; stylus supra breviter pilosus.

HONDURAS: moist thicket near Siguatepeque, Dept. Comayagua, alt. 1,100 m., *Paul C. Standley*, no. 55917, February, 1928 (Herb. Field Mus. No. 581,177, type); thicket along stream, *P. C. Standley*, no. 56346; pine forest, *P. C. Standley*, no. 55899.

In this plant the corolla and pubescence are much like those of *S. Lindenii* Benth., but in the latter the leaves are cordate or subcordate at the base.

#### SOLANACEAE

*Cestrum lanatum* Mart. & Gal. An ill-scented shrub 1.5–3 m. high, with pale green flowers. Frequent in moist thickets.

*Solanum diversifolium* Schlecht. A prickly shrub 2 m. high with white flowers. Frequent in moist thickets. Probably the most common *Solanum* of Central America.

*Solanum erythrotrichum* Fernald. A shrub of 2.5 m. with white flowers, growing in moist thickets. The species ranges rather widely, from Guatemala to Panama. In the Canal Zone it grows in wet thickets at sea level, under very different conditions from those prevailing about Siguatepeque.

*Solanum laurifolium* Mill. A prickly shrub 1.5 m. high, with unusually large and very showy, violet flowers; in moist thickets.

#### GESNERIACEAE

*Kohleria Deppeana* (Schl. & Cham.) Fritsch. A handsome shrub 1.5–2.5 m. high, with bright red, tubular flowers; in wet thickets at El Achote.

The shrubby plants of this family, which constitute perhaps the most brilliantly flowered group of Central American plants, are very rare in the parts of Honduras which I visited. They reach their best development in the mountains of Costa Rica, where the gorgeous *Columneas* often present vivid masses of color.

#### ACANTHACEAE

*Aphelandra Deppeana* Schlecht. & Cham. A shrub 1–2.5 m. high, bearing dense spikes of bright red flowers. Common in thickets along the river.

#### RUBIACEAE

*Cephalanthus salicifolius* H. & B. A shrub or small tree, 1–6 m. high, in habit much like the Buttonbush (*C. occidentalis*) of the United States. Abundant along small streams running through the pine forest.

*Rondeletia amoena* (Planch.) Hemsl. A shrub or small tree with handsome pink flowers, growing in wet thickets at El Achote.

*Rondeletia buddleioides* Benth. A tree 4.5–7.5 m. high, in thickets along streams.

*Bouvardia leiantha* Benth. A very slender shrub, a meter high or less, with graceful and brilliant, scarlet flowers. Growing under pine trees.

*Gardenia jasminoides* Ellis. JAZMÍN DEL CABO. A shrub with fragrant white flowers. Frequently grown for ornament.

*Anisomeris protracta* (Bartl.) Standl. A shrub or tree 2-6 m. high, in thickets along streams.

*Guetarda macrosperma* Donn. Smith. A slender shrub or tree 4.5-6 m. high, in thickets along streams.

*Coffea arabica* L. CAFÉ. Coffee is planted on a small scale about Siguatepeque, but is not grown for export. Substantial amounts of coffee are grown in some parts of Honduras, but in this crop the country is far behind the other Central American states.

*Psychotria fruticetorum*, sp. nov.

Frutex circiter 1 m. altus, ramulis subteretibus glabris, vetustioribus ferrugineo-brunneis rimosis, novellis viridibus; stipulae ovatae vel lanceolatae, 3.5-4 mm. longae, longe subulato-acuminatae, brunnescentes, caducae, minute scaberulae; folia opposita, glabra, petiolo gracili 3-5 mm. longo supra sulcato; lamina subcoriacea, obovato-oblonga vel oblongo-oblancheolata, 5-6.5 cm. longa, 1.7-2.5 cm. lata, acuta vel obtusa, basin versus longe sensimque cuneato-attenuata, supra glauco-viridis, costa non elevata, venis obscuris vel obsoletis, subtus paullo pallidior, costa prominente gracili, nervis lateralibus utroque latere 7-8 prominulis gracilibus angulo acuto adscendentibus subarcuatis prope marginem obscure conjunctis, margine paullo incrassato et revoluta, nervulis obsoletis. Inflorescentiae terminales cymoso-corymbosae vel umbelliformes, 5-14 mm. longe pedunculatae, pedunculo gracili glabro, pauciflorae, floribus subsessilibus, bracteis minutis; calyx 0.5 mm. longus, 5-lobus, lobis late ovatis obtusis. Fructus ruber, subglobosus, 3-3.5 mm. longus, pyrenis dorso obtuse costatis facie ventrali planis.

HONDURAS: thicket along stream, Siguatepeque, Dept. Comayagua, alt. 1,100 meters, *Paul C. Standley*, no. 56197, February, 1928 (Herb. Field Mus. no. 581,450, type).

Although this plant is not marked by any outstanding characters, it does not agree with any species of *Psychotria* hitherto known from Central America. It grows in thickets along the small streams in the pine-covered hills about Siguatepeque.

*Triodon angulatum* Benth. A low dense shrub, only 30-60 cm. high; flowers white. Common in the edges of streams.

*Borreria fruticosa*, sp. nov.

Frutex erectus 30-90 cm. altus, dense ramosus, ramis validis tetragonis ferrugineis glabris, internodiis brevibus vel elongatis; stipulae in vaginam 1.5 mm. longam scaberulam vel glabratam connatae, apice in aristas paucas 3.5-5 mm. longas erectas glabras desinentes; folia opposita, saepe in axillis fasciculis foliorum reductorum onusta, lanceolata vel



oblongo-lanceolata, acuta vel acuminata, apice subulato-mucronata, basin versus angustata vel saepe in petiolum brevissimum abrupte contracta, coriacea, glabra, supra luteo-viridia, costa subimpressa, nervis obsoletis, subtus pallida, costa prominula, nervis lateralibus paucis obscuris angulo angustissimo adscendentibus, margine revoluta. Flores subsessiles ad apices ramulorum subcapitati, capitulis paucifloris; hypanthium 2 mm. longum, turbinatum, glabrum; calyx 4-partitus, laciniis 2.5-3 mm. longis lineari-lanceolatis subulato-attenuatis viridibus basi obscure ciliolatis, denticulis minutis alternantibus; corolla viridescenti-alba, 2 mm. longa, extus glabra, fauce pilosula, fere ad basin 4-fida, lobis oblongis obtusis; stamina prope basin tubi inserta, filamentis brevissimis, antheris late oblongis; stylus gracilis, ramis 2 brevibus obtusis. Fructus cylindricus 4.5 mm. longus, 2 mm. crassus, glaber, laciniis calycis persistentibus coronatus, coccis apice tantum longitudinaliter dehiscentibus; semina oblonga, fusca, 2 mm. longa, placentae oblongae 3.5-4 mm. longae pallidae adnata.

HONDURAS: in pine forest, Siguatepeque, Dept. Comayagua, alt. 1,100 m., *Paul C. Standley*, no. 56240, February, 1928 (Herb. Field Mus. no. 581,484, type), no. 56019.

This plant represents a curious and interesting species. By its habit alone it is readily distinguished from all the other species of *Borreria* known from Central America, for it is a true shrub, stiffly erect, with well-developed woody stems. The seed characters are almost distinct enough to furnish generic characters for separating the plant from *Borreria*. They are almost exactly like those of the genus *Emmeorrhiza*, but the style is that of *Borreria*, and the habit is quite unlike that of the former genus, which consists of scandent suffrutescent plants with flowers in umbels. It seems preferable to place the Honduran plant for the present in *Borreria*, since I suspect that similar seeds may be found in some of the numerous species of that genus.

#### CAPRIFOLIACEAE

*Sambucus mexicana* Presl. SAUCO. A shrub or small tree, planted frequently about houses, probably because of the fact that it is often used in domestic medicine.

#### COMPOSITAE

*Vernonia canescens* HBK. A shrub 1 m. high with pinkish white flowers. Growing in pine forest.

*Vernonia Deppeana* Less. A shrub or tree of 2-5.5 m., bearing pinkish flowers. In thickets along streams.

*Vernonia melanocarpa* (Gleason) Blake. HOJA BLANCA. A bushy shrub 1.5-2.5 m. high with white flowers. Common in open pine forest.

*Vernonia tortuosa* (L.) Blake. A shrub 1.5-3 m. high, the flowers pinkish white, with a strong vanilla odor. In thickets along the river.

*Ageratum* (§ *Coelestina*) *Standleyi* Robinson, spec. nov., fruticosum erectum subgriseo-viride rigidiusculum usque ad 9 dm. altum scabridopuberulum; caule subtereti supra per abortionem axis principis saepe pseudo-dichotomo; ramis adscendentibus; foliis oppositis breviter petiolatis ovatis obtusis integerrimis margine revolutis textura rigidis supra scabridis puberulis et glandulari-granulosis subtus griseo-pannosis a puncto paullo supra basin 3-nervatis 1–2.2 cm. longis 7–13 mm. latis basi obtusis vel subtruncatis; petiolo 1–3 mm. longo; corymbis terminalibus modice convexis vel hemisphaericis ca. 3 cm. diametro; pedicellis 0–1 cm. longis; involucri campanulati ca. 4 mm. alti ca. 5 mm. diametro squamis subbiseriatim imbricatis angustissime lanceolatis attenuatis apice incurvis 2(–3)-costatis dorso puberulis et cum glandulis sessilibus globosis ornatis; receptaculo leviter conico nudo; corollis lavandulaceis ca. 3 mm. longis extus sparse granulatis; dentibus limbi brevibus vix 0.3 mm. longis deltoideis; styli ramis filiformibus elongatis; achaeniis nigris glabris lucidulis 2.2 mm. longis in summo cum cupula vix 0.2–0.3 mm. alta primo ut videtur infra sed maturitate distincte extra corollam coronatis.

HONDURAS: pine forest, vicinity of Siguatepeque, Dept. Comayagua, alt. 1080–1400 m., Feb. 14–27, 1928, *Paul C. Standley*, no. 56,234 (TYPE in Field Mus.)

The reduction of the pappus to a mere ring or low crown, which at least in its early stages appears morphologically beneath rather than exterior to the corolla, makes this species a somewhat doubtful intermediate between *Ageratum* § *Coelestina* and *Alomia*. In full maturity, however, this shallow and slightly undulate or toothed rim or crown of the achene is pretty clearly external to the base of the insertion of the corolla and may therefore be considered a rudimentary pappus rather than a mere specialized thickening of the receptacle at the articulation of the corolla and summit of the achene.

The small thick rigid entire leaves with dense pale gray indument on the lower surface should make the species easy to recognize among its congeners.—B. L. ROBINSON.

A shrub a meter high, with lavender flowers. Growing in open pine forest.

*Eupatorium collinum* DC. A shrub of 1–2 m., the flowers white. In pine forest. One of the common species of Central America.

*Eupatorium daleoides* (DC.) Hemsl. A slender tree of 4.5–7.5 m., growing in thickets along streams.

*Eupatorium* (§ *Subimbricata*) *hondurens* Robinson, spec. nov., fruticosum erectum 1.2 m. altum; caule subtereti brunnescente puberulo virgato vel sursum paucirameo usque ad 3–4 mm. diametro; foliis oppositis breviter petiolatis ovatis vel ovato-oblongis apice subacutis vel saepius obtusis leviter crenato-serratis basi rotundatis vel subcuneatim angustatis utrinque exserto-reticulatis puncticulatis pinnatim

paullo supra basin 3-5-nervatis 4-6.6 cm. longis 2-4 cm. latis textura coriaceis in costa nervisque tomentello-puberulis; petiolo tereti tomentello-puberulo ca. 5 mm. longo; inflorescentia breviter laxaque thyrsoida 4-9 cm. alta 3-9 cm. diametro apice rotundata; pedicellis 0.5-1.5 mm. longis; capitulis 12-13-floris ca. 6 mm. altis pedicellatis; involucri anguste campanulati squamis ca. 14 subtriserratis imbricatis, exterioribus lanceolatis acutis ca. 3 mm. longis et 1 mm. latis, interioribus oblongis vel anguste obovato-oblongis ad summum versus subdentatis cuspidatis, dorso glandulari-granulatis viridibus; corollis ca. 2-6 mm. longis sursum gradatim ampliatis, dentibus limbi perbrevibus; achaeniis 1.9-2.2 mm. longis sursum brevissime scabratis; pappi setis ca. 20 sublaevibus; styli ramis clavatis nigrescentibus saepe deflexis.

HONDURAS: brushy bank, vicinity of Siguatepeque, Dept. Comayagua, alt. 1080-1400 m., Feb. 14-27, 1928, *Paul C. Standley*, nos. 56,357 (TYPE, in Field Mus.; ISOTYPE in Gray Herb.) and 56,390 (Field Mus.).

This plant, with inflorescence and involucre slightly resembling those of *E. collinum* DC., differs much in its few-flowered heads, short petioles and firm reticulated leaves. Among the Central American *Eupatoriums* it may be placed near *E. costaricense* Ktze. from which, however, it may at once be distinguished by its shorter, thicker and much more shortly pedicelled heads, denser inflorescence, and more broadly ovate leaves as well as its relatively broader phyllaries.—B. L. ROBINSON.

A shrub a meter high, growing in pine woods and on open brushy banks.

*Eupatorium laevigatum* Lam. A shrub 2 m. high, in pine forest.

*Eupatorium micranthum* Less. A tree 4.5 m. high, in pine forest near El Achote.

*Eupatorium Oerstedianum* Benth. A shrub of 2.5 m., in moist thickets.

*Brickellia oliganthes* (Less.) Gray. A slender shrub a meter high, in open pine woods.

*Brickellia pacayensis* Coult. A shrub 1.5-2 m. high with pale yellow flower heads. In dry or moist thickets.

*Brickellia paniculata* (Mill.) Robinson. A shrub 1-1.5 m. high, characteristic of dry thickets.

*Pluchea odorata* (L.) Cass. SUACUAMÁN. An unattractive shrub 3-4.5 m. high, with pink flowers. In moist thickets. One of the common and more or less weedy shrubs of Central America, especially on the Pacific slope.

*Archibaccharis Standleyi* Blake in Jour. Washington Acad. Sci. 19: 271 (1929). On open rocky banks, no. 56193. A shrub a meter high, with white flowers.

*Baccharis serraefolia* DC. An erect shrub a meter high with greenish white heads. In pine forest.

*Baccharis splendens* Heering. A shrub 1.5 m. high, in pine forest.

*Baccharis trinervis* var. *rhexioides* (HBK.) Baker. A shrub 1-2.5 m. high, with recurved branches, the flower heads greenish white. Growing



in open pine forest. One of the widely distributed weedy shrubs of Central America.

*Nocca helianthifolia* var. *suaveolens* (HBK.) Robinson. Plants simple or sparingly branched, suffrutescent or herbaceous, about a meter high; flowers creamy white. Occasional in pine forest.

*Calea integrifolia* (DC.) Hemsl. A slender shrub a meter high; rays white, the disk yellow. Frequent in open pine woods.

*Calea Tejadae* Blake. A shrub a meter high, with dirty white heads. Abundant in open pine woods and on dry plains, forming extensive thickets.

*Calea urticifolia* (Mill.) DC. A shrub of 1-3 m., with yellow heads. Growing in wet thickets, on brushy banks, and in pine forest.

*Perymenium Purpusii* Brandeg. A low shrub, about a meter high, with yellow-green flower heads. Frequent in pine forest.

*Perymenium strigillosum* (Rob. & Greenm.) Greenm. A tree about 7.5 m. high, with pale shredded bark; flower heads greenish yellow. Frequent in thickets. This is one of the few Central American Compositae which become true trees. In Salvador its wood is highly esteemed for construction purposes.

*Tithonia Pittieri* (Greenm.) Blake. Suffrutescent, about a meter high; heads yellow. Growing in pine forest. A narrow-leaved form of this species, according to Blake, who refers here also another specimen, taken from a tall herb. The two plants are so unlike in appearance when growing, as well as in the herbarium, that it scarcely seems possible that they represent the same species.

*Verbesina sublobata* Benth. A shrub of 3 m. with large pinnatifid leaves and few branches. Occasional in dry thickets.

*Zexmenia frutescens* var. *villosa* (Polak.) Blake. A shrub of 2 m., the heads yellow. In open pine forest.

*Zexmenia melastomacea* Blake in Jour. Washington Acad. Sci. 19: 274 (1929). In pine forest, nos. 56389 and 55826. Suffrutescent or herbaceous, the heads yellow.

*Senecio arborescens* Steetz. A shrub or tree of 2-6 m., with few thick branches; leaves pinnately lobed. Sometimes forming small groves along streams.

*Senecio cobanensis* Coulter. A glabrous shrub or small tree 2-4.5 m. high, with yellow flower heads. Growing in thickets along streams.

*Trixis Deamii* Robinson. FLOR DE CAMPO. A shrub of 1-2 m., bearing numerous small yellow heads. Frequent in open pine woods.

FIELD MUSEUM OF NATURAL HISTORY  
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## THREE NEW PLANTS FROM YUCATAN

PAUL C. STANDLEY

DURING the summer of 1929, Dr. J. Bequaert, whose botanical explorations in western tropical Africa yielded such rich returns, collected about 100 numbers of plants in northern Yucatan. The whole collection including the duplicates was kindly presented to the Arnold Arboretum by the collector and a set of his well-prepared specimens was sent to the writer for determination. Although made in a region presumably explored thoroughly by earlier visitors, the collection was found to contain three plants not represented in available herbarium material from Yucatan. It is rather amusing to find that all three of these apparently new species were discovered at Chichen Itzá, the goal of most visitors to Yucatan.

Besides the new species, the Bequaert series contains specimens of many endemic and rare Yucatan plants, some of which, such as *Croton malvariscifolius* Millsp., have been known heretofore only from the type collection.

*Nemastylis Bequaertii*, sp. nov.

Herba 30–35 cm. alta, scapis supra medium ramosis subteretibus glabris viridibus spathas 4–6 gerentibus; folia radicalia late linearia, circiter 28 cm. longa et 13 mm. lata, longe sensimque attenuata, glabra 5-nervia, foliis caulinis brevioribus et 6–8 mm. latis; spathae circiter 6-florae, longe pedunculatae, pedunculo 4–8 cm. longo gracillimo glabro erecto vel adscendente; spathae bractae valde inaequales, interiore duplo brevior vel interdum exteriorem fere aequante, 2–3 cm. longae, longe et angustissime attenuatae, glabrae, multinerviae, erectae; flores longe pedicellati, pedicellis gracillimis usque ad 2.5 cm. longis glabris, inclusis vel breviter exsertis; ovarium oblongum, glabrum, 5 mm. longum, 2 mm. latum; perianthium ut videtur caeruleum circiter 9 mm. longum, segmentis late cuneato-obovatis apice late rotundatis; antherae lineares, 4 mm. longae rectae, connectivo gracili.

YUCATAN: in clearing of woods, Chichen Itzá, *J. Bequaert*, no. 109, June 30, 1929 (Herb. Field Mus. no. 603,516, type; isotype in Gray Herb.).

BRITISH HONDURAS: Honey Camp, *C. L. Lundell*, no. 577, October, 1929.

*Erythroxyton Bequaertii*, sp. nov.

Frutex vel arbuscula 3.5–4.5 m. alta, ramulis gracilibus subteretibus pallidis vel ferrugineis interdum substriatis glabris lenticellis albidis elevatis conspersis, internodiis brevissimis; stipulae parvae, persistentes, anguste triangulares, attenuatae, integrae, erectae, glabrae; folia petiolata, membranacea, petiolo gracili subtereti glabro circiter 5–6 mm. longo; lamina elliptico-oblonga, prope medium latissima, 2.8–5 cm. longa, 1–2.2 cm. lata, versus apicem obtusum vel anguste rotundatum angustata, apice breviter mucronata, versus basin sensim longeque angustata et ad petiolum longe decurrens, glabra, non areolata, supra

viridis, venis prominulis, subtus pallidior, costa gracili elevata, venis nervulisque prominulis et arcte reticulatis; flores ad axillas paucifasciculati, pedicellis glabris 4-5 mm. longis validiusculis angulatis; calyx circiter 1.7 mm. longus, 5-fidus, lobis ovatis acutis vel acuminatis crassiusculis; petala oblonga, 3-3.5 mm. longa, glabra, apice obtusa; tubus staminalis calyce paullo longior, filamentis elongatis tubo longioribus, antheris circiter 0.6 mm. longis.

YUCATAN: Chichen Itzá, *J. Bequaert*, no. 102, June 28, 1929 (Herb. Field Mus. no. 603,414, type; isotype in Herb. Arnold Arb.).

The species of *Erythroxylon* are, for the most part, poorly marked, and based upon characters of doubtful value. The present plant, although possessing no outstanding characters, does not agree with any of the species reported from Mexico or the West Indies.

*Stenandrium subcordatum*, sp. nov.

Herba scaposa perennis, 5.5-11 cm. alta e rhizomate brevi crasso nodoso; folia basalia longe petiolata, petiolo 1.5-2.5 cm. longo dense griseo-piloso; lamina membranacea, oblongo-ovata vel ovali-ovata, 3-4 cm. longa, 1.5-2.5 cm. lata, apice rotundata vel obtusissima, basi inaequali subcordata, utrinque pilis brevibus patentibus albidis densiuscule pilosula, ad nervos longius pilosula; scapus gracilis erectus dense pilis brevibus patentibus albidis pilosus, spica 2-3 cm. longa, dense multiflora, bracteis adpressis anguste linearibus 5-7 mm. longis attenuatis dense puberulis, bracteolis conformibus vel paullo angustioribus brevioribusque; sepala 5 lineari-subulata, 3.5-4.5 mm. longa, subulato-attenuata, nervulosa, scaberula, erecta; corolla purpurascens, glabra, tubo gracili 7-8 mm. longo circiter 0.8 mm. crasso, limbi lobis subaequalibus late obovatis 6-7 mm. longis apice rotundatis; antherae inclusae.

YUCATAN: in bush, Chichen Itzá, *J. Bequaert*, no. 20, June 3, 1929, (Gray Herb., type).

The plant is similar to *S. dulce* (Cav.) Nees, but in that the leaves are narrowed and decurrent at the base, and the bracts are broad and obtuse.

Blake, following Pennell, has used for this genus of the Acanthaceae the name *Gerardia*. In following the International Rules, I do not see that such a course is necessary, and it is surely preferable to retain the name *Gerardia* for the well-known genus of the Scrophulariaceae to which it has been applied by most botanists.

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## NOTULAE SYSTEMATICAE AD FLORAM SINENSEM

H. H. HU

*Schizophragma macrosepalum*, sp. nov.

Frutex scandens. Folia papyracea, oblongo-elliptica, circiter 17 cm. longa et 5 cm. lata, acuminata, basi subrotundata vel late cuneata,



integra, glabra, supra obscure luteo-viridia, subtus pallidiora et lucida, venis pubescentibus exceptis glabra; petioli 1.5 cm. longi, puberuli. Cymae tomentellae; calycis tubus sparse pilosulus; sepalum floris sterilis late ovatum, 7–11.5 cm. longum et 5–6 cm. latum, acuminatum, basi oblique subrotundatum, venis puberulis exceptis glabrum. Capsula subglobosa, 7 mm. longa et 6 mm. diam.

Climbing shrub. Leaves papery, oblong-elliptic, acuminate, 17 cm. long, 5 cm. broad, nearly rounded to broad-cuneate at base, entire along the margins, glabrous, obscurely yellowish-green above, shining and paler green beneath, glabrous except pubescent along the veins; petiole 1.5 cm. long, puberulous. Cymes tomentulous, calyx-tube sparsely pilosulous; sepal of sterile flower broad-ovate, 7–11.5 cm. long, 5–6 cm. broad, unequally roundish at base, acuminate at apex, glabrous except puberulous along the veins. Capsule subglobose, 7 mm. long and 6 mm. broad.

KWANGSI: Shih wan dar shan, south of Nanning, in woods, 350 m., *R. C. Ching*, no. 7871, Oct. 15, 1928 (type).

A striking species differing from all known species in the exceedingly large sterile flowers. Its entire leaf without the slightest dentation is like *S. hypoglaucum* Rehd., but the sterile flowers readily differentiate this species from the others.

*Sloanea Chingiana*, sp. nov.

Arbor ad 14 m. alta; truncus 30 cm. diam., cortice cinereo laevi obtectus; ramuli glabri, sparse lenticellati. Folia oblongo-lanceolata vel spatulata, ad 17 cm. longa et 5 cm. lata, longe acuminata, basi cuneata, integra, utrinque glabra, supra intense viridia, subtus pallidiora; petioli ad 5 cm. longi. Fructus 5–7, umbellati, pedunculo 6 cm. longo suffulti; pedicelli ad 3.5 cm. longi, glabri; capsula globosa, 1.5 cm. longa, valvis 3–4 satis tenuibus lignosis velutinis, setis 1 mm. longis viridibus (in sicco fuscis) dense obtectis; semina oblonga, 8 mm. longa et 6 mm. lata, lucide brunnea, arillata.

Tree to 14 m. high; trunk 30 cm. in diameter, with gray smooth bark; branches glabrous with scattered lenticels; leaves oblong-lanceolate to spatulate, long acuminate, cuneate at base, entire along the margins, to 17 cm. long, 5 cm. broad, glabrous on both surfaces, dark green above, lighter below; petiole to 5 cm. long; fruit 5–7, umbellate, on a common peduncle to 6 cm. long, pedicels to 3.5 cm. long, glabrous; capsule globose, 1.5 cm. long, valves 3–4, rather thin, woody, velvety, covered with dense green (brown when dry) bristles 1 mm. long; seeds oblong, shining brown, 8 mm. long, 6 mm. broad, arillate.

KWANGSI: Bako shan, W. Peseh, *R. C. Ching*, Sept. 17, 1928 (type).

Allied to *S. tomentosa*, its capsules being covered with short bristles and not spiny, but differing from it in its branchlets leaves and peduncles and pedicels being all glabrous, and the fruit smaller.

*Ostrya Liana*, sp. nov.

Arbor 16-metralis; truncus 60 cm. diam., cortice cinereo-nigro longitudinaliter fissio obtectus; rami ramulique glabri. Folia tenuia, membranacea, elliptico-ovata, 4-7.5 cm. longa et 2-4 cm. lata, acuta vel acuminata, basi leviter cordata vel rotundata, dupliciter et irregulariter serrata, supra glabra, subtus secundum venas puberula ceterum glabrescentia, venis utrinque 12-15; petioli graciles, 1 cm. longi, tomentelli. Inflorescentia mascula immatura 6-8 mm. longa, oblonga, bracteis acutis glabris lucidis. Racemi fructiferi circiter 2 cm. longi, fructibus 8-10, pedunculo 2-2.5 cm. longo; fructus 1-1.5 cm. longi et 6 mm. lati, utriculo compresso elliptico-ovato, apice acuto obliquo; nuculae ovatae, compressae, 7 mm. longae, lucide luteo-virides, apice glabrae.

Tree 16 m. high; trunk 60 cm. in diam., bark grayish black, longitudinally fissured; branches and branchlets glabrous; leaves thin, membranaceous, elliptic-ovate, 4-7.5 cm. long, 2-4 cm. broad, acute to acuminate at apex, slightly cordate to rounded at base, doubly and irregularly serrate along the margins, glabrous above, glabrescent except puberulous along the veins beneath, with 12-15 pairs of veins; petiole slender, 1 cm. long, tomentulous; immature staminate inflorescence 6-8 mm. long, oblong, with glabrous shining pointed scales; infrutescence about 2 cm. long, peduncle 2-2.5 cm. long, with 8-10 fruits, fruit 1-1.5 cm. long, 6 mm. broad, utricles laterally compressed, elliptic-ovate, with an oblique pointed apex; nutlets laterally compressed, ovate, 7 mm. long, shining yellowish green, glabrous at the apex.

CHIHLI: Eastern Tomb, *Cheng Fan Li*, No. timber no. 3, Sept. 15, 1929 (type).

Allied to *O. japonica* Sarg., differing in the much smaller fruits and shorter fruit clusters, and nearly glabrous lower surfaces of the leaves.

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## NEW SPECIES AND A NEW GENUS FROM EAST AFRICA

J. MILDBRAED

THE plants collected in Central and East Africa from December, 1926 to April, 1927 by Dr. D. H. Linder who accompanied the Expedition of the Harvard Institute of Tropical Biology and Medicine to Tropical Africa as collector for the Arnold Arboretum had been sent, with the exception of the Orchids, to the Botanical Museum at Berlin-Dahlem for determination.<sup>1</sup> As the expedition after having spent about five months in Liberia traversed rather hurriedly regions of the Belgian Congo and East Africa which were already fairly well explored botanically, the collection comprising about 800 numbers from this part of Africa did

<sup>1</sup> The collections made in Liberia have been sent to Kew where they are being determined in connection with the publication of the Flora of Tropical West Africa by Hutchinson & Dalziel. Descriptions of new species wholly or partly based on Linder's plants have been published in the Kew Bulletin for 1928, p. 380 and 400 and for 1929, p. 20-23.—Ed.

not contain many new plants. Descriptions of five new species of which one represents a new genus follow below.

*Alchemilla Linderi*, n. spec.

Decumbens et adscendens, ramosa, ramis omnino glabris rubescentibus praestantibus ad 30 cm. longis, internodiis 3–0.5 cm. attingentibus. Foliorum petiolus longe sericeo-pilosus vix dimidium laminae aequans; stipulae basi connatae ceterum liberae oblique semi-ovatae vel fere semi-orbiculares, margine crenato-serratae et (imprimis apice dentium) ciliatae, petiolo manifeste longiores; lamina margine ciliato et nervis primariis supra impressis subtus parce adpresse pilosis exceptis glabra, subcoriacea, sub lente dense reticulato-venosa, reniformis, basi sinu late aperto, 1.2–1.6 cm. lata, quinqueloba, lobo mediano ad fere  $\frac{2}{3}$ , laterales ad  $\frac{1}{3}$  vix  $\frac{1}{2}$  radii incisis, omnibus obovatis margine minute crenato-serratis dentibus incurvis. Inflorescentiae elongatae, ramosae ramis glabris; bracteae quasi collare irregulariter (in superioribus saepe 4-) lobatum usque partitum lobi minoribus saepe integris, majoribus paucidentatis dentibus plerisque basi latioribus quam longioribus efformantes; flores breviter pedicellati, glabri; calycis dentes late semi-ovati, apice paululo apiculato-acuminati, ca.  $\frac{3}{4}$  mm. longi; stamina brevissima.

UGANDA: east of Behungi, in meadow, *D. H. Linder*, no. 2576, April 5, 1927. Type in Bot. Mus. Berlin; isotype in Gray Herb.

This new species is most closely related to *A. Mildbraedii* Engl. (cf. figure in Wiss. Ergebn. Deutsch. Zentral Afrika Exp. 1907–08. II. Bot. tab. 21), but it differs in the shorter petioles and particularly in the much broader lobes of the bracts forming a rigid spreading irregularly lobed and cut collar.

*Erica Linderi*, n. spec.

Frutex ex coll. 3–6 pedalis dense ramosus, ramulis erecto-patentibus novellis bruneo-rubrescentibus minutissime albedo-puberulis, vetustioribus glabratibus atro-violascenti-bruneis. Folia ternato-verticillata cum petiolo vix 1 mm. aequante ca. 4 mm. longa, vix 1 mm. lata, obtusa, dorso sulcata, margine vix ciliato. Flores apice ramulorum plures congesti; pedicelli graciles, ca. 5 mm. longi, prope basin bractea unica lineari obtusa et medio 2 oppositis subadpressis basin calycis haud attingentibus instructi; sepala anguste ovata, 1.8 mm. longa, acuta; corolla ex coll. alba 3 mm. longa vel paulo longior, triente inferiore 2 mm. diam. vix aequans, faucem versus paulo constricta, lobi erecto-patentes 1 mm. longi et basi aequilati, valde obtusi; stamina 8 basin loborum tantum attingentia ideoque semper inclusa; filamenta tenuissima antheris ca. 1 mm. aequantibus subduplo longiora. Ovarium turbinatoglobosum, sub anthesi vix 1 mm. altum, stilo 3 mm. longo corollam sat longe superante coronatum.

UGANDA: meadow east of Behungi, in Red-hot Poker Meadow, *D. H. Linder*, no. 2579, April 5, 1927 (shrub 3–6 ft. tall; flowers white). Type in Bot. Mus. Berlin; isotype in Arnold Arb.



Closely related to *E. rupegensis* Engl. which also has the pedicel with two bracts in the middle, but differs in the much slenderer corolla, in *E. rupegensis* nearly 3 mm. in diameter in the lower third. *Erica kingaensis* has still broader flowers and only one bract above the middle of the pedicel.

***Buchnera stachytarphetoides* Mildbraed & Melchior, n. spec.**

Herba ut videtur perennis, caule simplici subcylindrico praeter lineas 2 longitudinales pilis brevissimis horizontaliter patentibus obsitas glabro, in sicco nigra, fere 70 cm. alta. Folia opposita, lanceolata, sessilia, apice obtusa ad 3 cm. longa et 7 mm. lata, inferiora quam internodia duplo longiora, superiora eis subaequilonga, numerosa (ad 30 paria), in bracteas floriferas sensim minores transeuntia, glabra, integra. Spica dimidio inferiore tantum florens jam 25 cm. longa, sublaxa sed bractearum apicibus basin parvis sequentis attingentibus; bracteae foliis similes sed margine breviter setose-ciliatae, medio spicae 11 mm. longae et 3 mm. latae; prophylla lanceolato-lineariter ca. 6 mm. longa et 0.8 mm. lata, margine parum ciliata. Flores ex coll. colore Lavandulae; calycis tubus anguste cylindricus, 10 mm. longus et vix 1.5 mm. diam., glaber, dentes 6 (semper?) semilineari-lanceolati, parce ciliati, 2 et 3 mm. longi; corollae glabrae tubus fere 2 cm. longus, 1 mm. diam., lobi ovales vel paulo obovato-ovales, basi subcuneato-angustati, apice rotundati, ca. 8 mm. longi et 4 mm. lati, intus faucem versis strigoso-pilosi; stamina paulo supra medium tubi inserta, bina filamentis ca. 2 mm. longitud. aequantibus et antheris apiculatis subaequilongis, bina antheris subsessilibus; ovarium glabrum, ellipsoideum, ca. 2 mm. longum, stilus vix 4 mm., stigma ambitu lanceolatum, obtusum, 3 mm. longum.

BELGIAN CONGO: Kivu Lake, Nyagezi, *D. H. Linder*, no. 2014, Feb. 3, 1927 (flowers lavender, soon blackening). Type in Bot. Mus. Berlin; isotype in Gray Herb.

Apparently most nearly related to *B. usuiensis* Oliv., but differing in the looser spike and chiefly in the corolla tube which is considerably longer in proportion to calyx and bracts. *Buchnera Lastii* Engl. is also similar, but has smaller flowers.

***Parastriga*, nov. gen.**

Calyx late campanulato-cyathiformis dentibus 5 brevibus subaequalibus. Corollae tubus cylindricus fauce galeato-amplius et prorsum curvatus, limbus 5-lobatus, lobis subaequalibus e basi lata apicem versus angustioribus reflexis. Stamina 4, subaequalia, vix didynama, filamentis parte superiore tubi insertis, antheris unilocularibus curvatis longitudinaliter deshiscentibus declinatis inclusis. Ovarium placentis crassis ovulis numerosissimis instructis, stilus declinatus, stigma linguiformi-dilatatum et -incrassatum.—Herbae parvae habitu Alectrae vel Euphrasiae.

***Parastriga alectroides*, n. spec.**

Herba exsiccatione nigricans caule tenui simplici (semper?) 10–25 cm. longo, subglabro vel apicem versus pilis curvatis collapsis capitatis hyalinis imprimis ad lineas 2 longitudinales instructo, internodiis infimis ad 7 longis superioribus 3–1 cm. vel etiam brevioribus. Folia opposita glabra, praeter par infimum florifera, sessilia, late triangulari-ovata, basi late truncata et subcordata, apice obtuso interdum apiculata, 1.3 cm. longa et aequilata vel minora. Flores in foliorum axillis solitarii subsessiles; calyx breviter late campanulato-cyathiformis cum dentibus 5 subaequalibus triangularibus basi ca. 3 mm. latis et subaequilongis acutis 8 mm. longus et fere 6 mm. diam., glaber vel margine parce glanduloso-ciliatus, nervis primariis 10 inter sese reticulatim conjunctis; corollae ex coll. roseae tubus circa ovarium magnum parum ampliatus, deinde 3 mm. longe anguste cylindricus, ca. 1.5 mm. diam., fauce galeato-ampliatus et prorsum curvatus, lobi 5 subaequales ca. 4 mm. longi, e basi 2.5 mm. lata semi-oblongi obtusi sed marginibus revolutis saepe pseudo-acuminati, paulo obliqui, reflexi, infimus medianus quam alii paulo longior et angustior; stamina in parte superiore tubi cylindrici inserta, superiora paulo altius, inter sese fere aequalia, filamenta superiorum 2 mm. inferiorum 2.5 mm. longa, antherae uniloculares 1.5 mm. longae, curvato-declinatae inter sese parallelae; ovarium ellipsoideum glabrum, placentis crassis ovulis numerosissimis; stilus glaber declinato-curvatus apice in stigma linguiforme 3–4 mm. longum dilatatus et incrassatus, stamina manifeste superans. Capsula ut videtur nondum perfecte matura (stilo etiam coronata) ovoidea, subacuta, 8 mm. longa, 5 mm. diam., semina 0.5 mm. longa, fusiformi-ellipsoidea, pallide brunea.

BELGIAN CONGO: volcanic region near Kivu Lake, southwest slope of Mt. Mikenno, alt. 7250 ft., in wet crater meadow, *D. H. Linder*, no. 2428, March 23, 1927 (Flowers pink). Type in Gray Herb.; merotype in Bot. Mus. Berlin.

This new genus closely approaches *Striga* in the structure of the anthers and of the ovary but differs completely in the shape of the corolla.

*Justicia kiwuensis*, n. spec.

Herba satis ramosa ramis secus lineas 2 longitudinales imprimis apicem internodiorum versus deflexo-hirsuto-pubescentibus. Folia pro rata parva, anguste ovata, basi rotundata vel ex rotundato breviter in petiolum tenuem ad 4 mm. longum angustata, apice obtusa vel late indistincte subacuminata, sicca atro-olivacea, supra subtusque breviter pubescenti-hirsuta, ad 2.5 cm. longa et 1 cm. lata, raro pro longitudine latiora. Flores in foliorum axillis plerumque tantum bini, parvi; bractae foliaceae petiolo lato ca. 1.5 mm. longo, lamina ovali 2 mm. aequante; prophylla minuta, triangulari-subulata; calycis dentes ad basin fere liberi, lineari-subulati, ca. 3 mm. longi et 0.5 mm. lati, subcarinati, apice longe sensim acuminati et paulo recurvi, pilis nonnullis parce hirsuti; corollae ex coll. albiae fauce pallide roseo-notatae tubus ca. 3 mm. longus; labium superum 3.5 mm. longum, basi 2.5 mm. latum, apice

breviter bilobum; labium inferum 4 mm. longum et fere aequilatum, basin versis modo generis bullatum, 3-lobum, lobis subaequalibus vix 1 mm. longis basi ca. 1.5 mm. latis valde obtusis; staminum filamenta 2.5 mm. longa, antherarum thecae inaequales, inferior major et basi calcarata, ovarium glabrum in stilum fere 4 mm. longum glabrum attenuatum. Capsula straminea, glabra 6 mm. longa et paulo supra medium ca. 1.5 mm. diam., valde acuta; semina in visa 3.

BELGIAN CONGO: Ruanda, Kivu Lake, Kissenyi, river bank, *D. H. Linder*, no. 2024, Feb. 10, 1927 (semi-prostrate, spreading; flowers white with pale spinel-pink in throat). Type in Gray Herb.

Similar to *J. melampyrum* S. Moore, but it has broader shorter-petioled leaves; moreover only normal capsules could be found.

*Crossandra massaica*, n. spec.

Perennis suffrutescens pedalis vel altior, caulibus cylindricis juventute puberulis demum glabratis lignescentibus ad 4 mm. crassis, e vetustioribus ramulos abbreviatis dense foliatis emittens. Folia supra subtusque imprimis ad nervos parce puberula usque subhirta, lamina plerumque ovato-lanceolata vel lanceolato-elliptica, rarius fere ovata vel oblongo-lanceolata, basi breviuscule usque sat longe in petiolum  $\frac{1}{3}$  ad fere  $\frac{1}{2}$  laminae aequantem angustata, apice acuta vel paulo acuminato-acuta vel fere obtusa, in ramis primariis ad 8 cm. longa et 3.5 cm. lata, in lateralibus abbreviatis minora et pro longitud. angustiora. Pedunculi axillares et pseudoterminalis, tenues, stricti, 4–12 cm. longi, puberuli; spicae ellipsoideae sine corollis 2–3 cm. longae et ca. 7.3 cm. crassae; bractae 3–4 infimae, vacuae sensim minores, omnes carinato-cymbiformes scariosae, praeter medianum utrinque nervis 2 crassis percursae, nervis omnibus venis reticulatis sat crasse prominentibus reticulatim conjunctis, margine longe sericeo-ciliatae, ceterum sub lente dense brevissime hirtae, ovato-ellipticae, 15 mm. longae et paulo infra medium 8 mm. latae, apicem haud vel vix reflexum versus sensim acutae, prophylla anguste lanceolato-lineararia, apicem versus fere subulata, 9 mm. longa vix 1.5 mm. lata, scariosa, ciliata; sepala hyalina, apicem versis ciliata et nervis excurrentibus subaristata, posticum ellipticum, 6–7 mm. longum, fere 4 mm. latum, apice ad 1.5 mm. bidentatum, 2-nervium, anteriora elliptico-lanceolata aequilonga, uninervia, 2 interiora manifeste minora, vix 4 mm. longa, ceterum anterioribus similia; corollae auranticae tubus 18–20 mm. longus, anguste cylindricus, lobi 2 posteriores 8 mm. longi, medio ad basin separati, latere altero cum lateralibus a fauce 11 mm. longis apice breviter bilobis lobulis rotundatis altius connati, anticus a fauce fere 12 mm. longus, 9 mm. latus, sinu acuto ad 2.5 mm. a margine bilobus, a lateralibus sinubus valde angustis paulo ultra medium radii incisus sejunctus; stamina ca. 4 mm. infra faucem affixa, filamentis brevissimis, antheris 1.5 mm. longis subaequalibus; ovarium glabrum, 3 mm. longum, 1 mm. crassum, acutum, stilus 12 mm. longus, stigma incrassatum apice truncatum, dorso gibbosum. Capsula glabra, 11



mm. longa, compressa, pungenti-acuta; semina 2-3 mm. diam., complanata squamis late cuneatis plus minusve laceratis oblecta.

EAST AFRICA. Kenya Colony: Kikemu, near Lake, D. H. Linder, no. 2639 (type), April 21, 1927 (1 ft. high; flowers orange). German East Africa: Ermessa, east of Ikorna, Jaeger & Oehler, no. 349, Jan. 3, 1907 ("Ranke zwischen Granitblöcken, Bl. fleischrot"); Marienhof, Ukerewe Island in Victoria Nyanza, P. Conrads, no. 509, Dec. 18, 1912 ("Staude oder Strauch auf Termitenhügel; viele Stengel; Bl. rot"). Type and paratypes in Bot. Mus. Berlin; isotype in Gray Herb.

This species is nearest to those forms of *Crossandra nilotica* which in Thiselton-Dyer, Fl. Trop. Afr. v. 115 have been called var. *acuminata* Lindau and particularly to the specimens collected by Schweinfurth in Eritrea. These have the bracts almost as narrow but thinner, more leafy, less rigid, glandular-pubescent and with less prominent veins.

Botanisches Museum  
Berlin-Dahlem.

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## NOTES ON FOREST DISEASES IN NOVA SCOTIA

J. H. FAULL

SOME attention has been given to the insect pests of the forests of Nova Scotia, but almost none to their diseases. Such a large part of the province is adapted solely to productive forest growth that under proper management these lands should yield a handsome perpetual income. The Spruces grow like weeds and tend to overrun areas cleared for agriculture. There are besides these the White Pine, Balsam Fir, Hemlock, Birch, Poplar, Beech, and Hard Maple in abundance, and certain other species of lesser frequency. The province is especially rich in potential pulpwood production. An effective fire protective service is in operation, a public forest conscience is being cultivated, and steps are under way with the end in view of regularized scientific management. It is certain that if this last purpose is to be accomplished most effectively it will be essential to become acquainted with those natural forces that inevitably bring about deterioration in the forest unless intelligently combatted. Standing out prominently among them are the forest diseases.

As a preliminary to their hoped-for study, I was invited by the Department of Lands & Forests to make a pathological reconnaissance. It was possible to devote the latter half of July, 1929, towards this end. I was extremely fortunate to have as companion the Provincial Forester, Mr. Otto Schierbeck, a greater part of the time. Through his unfailing enterprise, abounding energy and intimate knowledge of the forests of Nova Scotia, an opportunity was afforded, otherwise impossible within the limits of such a short period of time, to see representative cross-

sections of most of the larger forest areas of the province and to gain a notion of many of their problems. A few notes are offered on some of the diseases seen, several of which have not heretofore been recorded for Nova Scotia. New records are designated by an asterisk (\*).

The more common native diseases of White Pine found elsewhere also occur in Nova Scotia, but there is one introduced disease, the blister rust, that calls for comment. That it had found its way into Nova Scotia has been known for several years, but up to the present had been seen on Currant bushes only. Rusted *Ribes oxycanthoides* (Smooth Gooseberry), *R. prostratum* (Skunk Currant), and *R. nigrum* (Black Currant of gardens) were observed everywhere, but it is important to note that two or three young Pines (eight or ten feet in height), members of a fine, vigorous, even-aged stand near Chester were found in fatal attack.\* Blister rust cankers had girdled their stems near the ground. European experience with this rust has been a very unhappy one. It has wiped out or wrecked plantations in many places, and in several countries, as a result, efforts to grow White Pine have been abandoned. (PERLEY SPAULDING, White Pine Blister Rust; A comparison of European with North American conditions. U. S. Dept. of Agriculture, Technical Bull. 87: 1-58. 1929). This rust is now widely spread throughout the 5-needled Pine belts of North America. In some areas it has severely attacked the White Pine, especially the younger growth, and some attempts here and there, said to be economically successful, have been made to control it by eradication of the associated Currants and Gooseberries. Eventually it may be wise to designate what areas in Nova Scotia are to be conserved for the growing of White Pine and to eradicate the *Ribes* (Currants and Gooseberries) from them. But for the immediate future it would seem to be the better part of wisdom to place the rust under careful observation. This could be done easily and inexpensively by establishing various plots suitably located and have them checked up annually. If this is to be done, however, there should be no delay in the undertaking.

There are many native rust diseases of Conifers in Nova Scotia. The life histories of several of them were worked out by Professor W. P. Fraser at Pictou and MacDonald College (Cultures of Heteroecious Rusts in *Mycologia*, 3: 67-74. 1911; Cultures of Heteroecious Rusts in *Mycologia*, 4: 175-193. 1912; Further Cultures of Heteroecious Rusts in *Mycologia* 5: 233-239. 1913; Notes on *Uredinopsis mirabilis* and other Rusts in *Mycologia* 6: 25-28. 1914) and Professor H. P. Bell of Dalhousie University. (Fern Rusts of *Abies*, in *Botanical Gazette* 77: 1-31. 1924.) While they are probably mostly interesting from a mycological point of view some are of pathological significance, and reference should be made to a few of them.

The destructive cone rust of the Red, Black and White Spruces was found to be abundant in many places. On one small Black Spruce,

observed near Lawrencetown, 279 out of its 500 cones were completely destroyed by the rust. Obviously in harvesting Spruce cones for seed care should be taken not to include the rust-blasted ones and not to gather cones from the smaller trees. An unexpected find, quite frequent on Red and Black Spruces (Beaver Bank, Chester, Lawrencetown, etc.) was the broom rust caused by *\*Peridermium coloradense*. This broom-forming rust is widespread in North America. "It not only attacks and stunts the twigs and branches of young trees, but also brooms and dwarfs saplings and older trees."

Interesting as a new record in America was the finding of the *Vaccinium* rust of Hemlocks (*\*Thecopsora Vacciniorum*) on *\*Vaccinium Vitis-Idaea* var. *minus* at St. Peter's, Cape Breton.

Of the many Rusts of Balsam Fir those caused by *\*Milesina Kriegeriana* and *\*M. polypodophila* may be mentioned as new records for Nova Scotia. The former was found in a very heavy infestation in Guysboro Co., and one unusual feature it manifested was the adherence of the whitened needles of 1928 en masse, killed by it last year. The latter Rust is characterized by its habit of causing malformed, loosely-broomed trees. Another Fern Rust of Balsam found was that caused by *\*Hyalopsoara Aspidiotus*. Two others found in surprisingly large amounts were the Broom-rust of Balsam Fir due to *Melampsorella Caryophyllacearum*, and the Blueberry Rust due to *Calyptospora Goeppertiana*. Stunted trees with hundreds of brooms were seen in Cape Breton, and the latter rust approached economic importance in parts of Guysboro Co.

Turning to other crown diseases of Conifers attention should be called to several. These included various needle cast diseases caused by species of *Lophodermium* and its allies. They have been turned over to Mr. G. D. Darker for identification. A curious *\*yellowing* of the foliage of White Spruce and *\*Balsam Fir*, a chlorosis of unknown cause but of curious interest, was encountered more than once in the western part of the province. A needle blight of Balsam caused by *\*Acanthostigma parasiticum* was abundant at Beaver Bank. "Red branch" of Balsam is common in places, very striking because of the totally red branches on otherwise green trees. This is generally caused by winter frost following the gnawing of bark by beetles (*Monohamus*), but a great deal proves to result from a girdling fungus, *\*Valsa Friesii*. Brooms caused by the dwarf Mistletoe, *Arceuthobium pusillum* are not uncommon on Black and *\*Red Spruces*.

Standing out as perhaps most interesting of all is a widespread condition of Balsam Fir, involving practically all of the trees of entire stands, what I would designate for want of a better term as *\*"Gout."* The trees are stunted, the trunks taper rapidly and never reach normal height, the joints are very much swollen and the twigs in general are thickened and tend to be deflexed. My attention was called to it par-



ticularly by Mr. Schierbeck who has been observing it for several years past.

The trunk diseases of Balsam Fir and the Spruces have an important bearing on questions of fire protection, cutting cycles, sanitation, and utilization. Balsam was found to be affected with *\*Poria subacida*, *\*Polyporus balsameus*, *\*Polyporus Schweinitzii*, and *\*Stereum sanguinolentum*, and Spruce by *\*Stereum sanguinolentum*, *Trametes Pini*, and others not determined. That a much greater use could be made of the large quantities of wood affected with pecky heart rot (caused by *Trametes Pini*), and red rot (caused by *Stereum sanguinolentum*) is reasonably certain. These and other trunk diseases will also be more and more brought under control with improved methods of management.

Coniferous seedlings in the Provincial Forest Nursery have suffered severely from "heaving" and damping-off. Both of these troubles are amenable to correction, and doubtless steps will be taken to overcome them.

As for the diseases of the hardwoods perhaps the two outstanding ones are the Willow blight, and the bark disease of Beech. An examination of the latter has already been made by the Federal Entomological Branch, and the latter by Drs. G. P. Clinton and F. A. McCormick of the Connecticut Agricultural Experiment Station at New Haven. Dr. Clinton and his associate report that the cause is a fungus, *Fusicladium saliciperdu*, and that it can be effectively controlled by repeated spraying in the spring, four or five times from the period of bud swelling to the final expanding of the leaves, with Bordeaux mixture. They are continuing their investigations, the results of which are awaited with interest.

As a feature apparently not so far noticed is the fact that the *\*White Poplar* (*Populus alba*) seems to be susceptible to the same disease. I saw repeated instances of it in various parts of the province. A similar disease was also noted on *\*Carolina poplar*, but this appears to result from the attacks of an allied species of fungus.

Finally, a yellow spotting of Birch leaves (*Betula populifolia*), by *\*Exoascus flavus* and a bark canker of the Aspen (*Populus tremuloides*) caused by *\*Hypoxyylon pruina* constitute new records. The latter was first noted in some improvement thinnings where it was killing trees outright, but it was subsequently found several times elsewhere. It is important that acquaintance should be made with this disease of the Aspen and the Broad-toothed Poplar, and that care be taken to remove and burn affected trees from areas devoted to improvement operations. "Hypoxyylon canker" is an insidious disease, easily overlooked, that works quickly and fatally in trees of all ages. Stands are known in which the mortality from this disease has been as great as seventy per centum.

## NOTES

Young. "Botaniste de Pensylvanie."—The library has recently obtained an almost unique copy of "Catalogue d'arbres, arbustes et plantes herbacées d'Amerique. Par M. Yong, botaniste de Pensylvanie. Ce Catalogue est divisé en deux parties; la premiere contient les Plantes que M. Yong peut fournir aux Européens, soit en graines, soit en plantes. La seconde contient celles qu'on ne pourra se procurer, qu'en les demandant dans d'autres Provinces. À Paris, De l'Imprimerie de la V<sup>e</sup>. Hérissant, Imprimeur de Cabinet du Roi, Maison & Bâtimens de Sa Majesté. M.DCC.LXXXIII."

It consists of 55 pages, sm.8°, and is unbound, page 55 being supplied in MS. by J. Deniker, Bibliothécaire en chef, Muséum d'Histoire Naturelle de Paris, from a copy in that library.

This is the earliest published book by an American botanist and devoted exclusively to American botany, horticulture and floriculture. It is a curious fact that it has been either purposely ignored or entirely overlooked by scientists, historians and bibliographers. Prior to its discovery by S. N. Rhoads in 1915, it was believed that Humphrey Marshall's "Arbustrum Americanum" was the first treatise on American plants, by a native American and printed in this country. Young's work, though not originally printed in America, is, in other respects in the same category as the "Arbustrum" and antedates it by two years, and it is interesting to note that Marshall refers to it on page 48 of his "Arbustrum," where under *Fothergilla Gardeni* he says: "This, in some late catalogues, has been called *Yuongsonia*, in honour of William Young, botanist of Pennsylvania; but by Dr. Linnæus, *Fothergilla* in honour of the late Dr. Fothergill of London. It was first sent to Europe from Carolina, by John Bartram, to his friend P. Collinson, by the title of *Gardenia*." This, Mr. Rhoads says, is the only reference to Young's Catalogue which he had been able to find in all literature.

Young, on the other hand, in his Catalogue, under *Yongsonia* declares, "Il a été apporté à Londres dans l'année 1769 & ensuite envoyé au sieur Linnæus par le sieur Fothergill, & j'ai appris que le sieur Linnæus lui a donne le nom de *Yongsonia*." An interesting contradiction of statement. Dr. Alexander Garden of Charleston, had previously sent it to Linnæus in 1765, as noted by Sir J. E. Smith under Garden's letter to Linnæus, dated May 18th of that year.

The Arboretum copy is that discovered by S. N. Rhoads in Scotland and was originally the property of R. Barclay whose name appears in manuscript on the title-page, together with manuscript notes in the margins. Mr. Rhoads, in 1916, had facsimile copies made of the work, under the title: "Botanica neglecta. William Young, jr. (of Philadelphia) 'Botaniste de Pensylvanie' and his long-forgotten book." In his preface to the facsimile Mr. Rhoads has given a full and interesting account of Young who seems to have been more or less a pretender to

his own botanical laurels. "Careful research and correspondence with several of the best libraries and authorities failed to discover any bibliographic allusion to Young's work, and a canvass of the more important American libraries failed to discover a single copy of this work."

Many new names are cited in the "Catalogue" which, lacking descriptions, cannot be identified and as Young is suspected of giving names to aid the sale of his seeds and plants, they cannot be taken seriously.

Though this little book will never "shake the foundations of botanic priority" it lays large claim to bibliographical and historical interest. "Resurrected from a life-long oblivion of 132 years, it now assumes a significant place in the early history of American Botany, and the meteoric career of its obscure author, from an amateur collector of seeds and plants under the guidance of Dr. Garden, to the post of Botanist to Queen Charlotte of England, serves to heighten our interest in his celebrated botanical contemporaries of the golden age of Bartram, Marshall, Collinson, Fothergill, Ellis and Linnæus."—E. M. T.

**Index londinensis to illustrations of flowering plants, ferns and fern allies.**<sup>1</sup>—The first volume of this revised and enlarged edition of Pritzel's Index to botanical illustrations is now before us and at the first glance one is struck by the vastly greater size of this new work. While Pritzel's Index consists of a single quarto volume with about 107,000 entries, the new Index will comprise six folio volumes with nearly 500,000 entries. Volume I contains references to the genera from Aa to Campanopsis on 547 pages of three columns each. All the citations in Pritzel's Index, with only few citations eliminated, are found in the new Index, which includes the literature published up to 1920. The citations are selected not only from botanical but also from horticultural literature and include also varieties and forms with botanical (i. e., Latin names), while garden forms with names in the vernacular are excluded, thus pictures under names like *Camellia corallina* are cited, while those with names like *Camellia* "Maria Dorothea" are not. This may seem a somewhat arbitrary segregation, but from a practical viewpoint it seems to be the only feasible one.<sup>2</sup> The indication regarding the nature of the illustration cited, whether the illustration is general or represents only flowers, fruits, vegetative parts, habit or a teratological state and whether it is colored or not are very helpful and will save needless looking up illustrations of a character not wanted. Another very helpful feature is the cross-references to synonymous names of genera where additional illustrations may be found, for all illustrations are enumerated under the names they were published under, which is the only procedure feasible in a compilation of

<sup>1</sup> Index londinensis to illustrations of flowering plants, ferns and fern allies being an emended and enlarged edition continued up to the end of the year 1920 of Pritzel's alphabetical register of representations of flowering plants and ferns compiled from botanical and horticultural publications of the XVIII and XIX centuries prepared under the auspices of the Royal Horticultural Society of London at the Royal Botanic Gardens, Kew, by O. Stapf. Vol. I. xx + 547 pp. F. Oxford, Clarendon Press, 1929.

<sup>2</sup> See also note on names of horticultural variations in this Journal, x. 65.



this size and character, but results in many cases in the enumeration of the same plant under different names. One finds, e. g., after *Azalea* a reference to *Rhododendron* and a note that *A. procumbens* is *Loiseleuria*; under *Bignonia* 49 genera are enumerated with a number for each genus; this number appearing after the specific name indicates the genus to which that particular species had been referred and which should be looked up for further references. The great increase in citations as compared with Pritzel's Index will appear from some examples as, *Abelia* with 11 citations in Pritzel and 78 in the new Index, *Abies* with 48 as against about 1,000, and *Acer* with 80 as against more than 1,600 citations, which shows in the last two instances 20 times as many citations in the new Index as in Pritzel's Index, but it is only in horticulturally important genera that the increase is so high. The volume is well printed on good paper in clear type and does credit to the Clarendon Press.

The Royal Horticultural Society is to be congratulated for having sponsored and successfully put through, under the able leadership of Dr. O. Stapf, a work of such magnitude and of such usefulness to the botanical and horticultural world. It is an indispensable reference book and no botanical or horticultural library can be complete without it.—A. R.

**Illustrations of Chinese Plants.**—Of the *Icones plantarum sinicarum*<sup>1</sup> of which the first fascicle was noted in this Journal two years ago (Vol. ix. 32), the second fascicle has now appeared. This fascicle is dedicated to Dr. Augustine Henry. The arrangement and general appearance of the work is the same as of the first fascicle, but a great proportion of the plants described and figured are species recently published or at least not yet figured; there is also an improvement noticeable in the drawings. All the species except one represent woody plants of which the following deserve special mention as being comparatively new or still little known: *Ephedra sinica* Stapf, *Ostrya Rehderiana* Chun, *Lithocarpus Fordiana* Chun, *L. Elizabethae* (Tutcher) Rehd., *Quercus Chenii* Nakai, *Magnolia Duclouxii* (Fin. & Gagnep.) Hu, *Deutzia Chunii* Hu, *Rubus Chingii* Hu, *R. Hui* Diels, *Cerdis Chingii* Chun, *Mucuna Birdwoodiana* Tutcher, *Monimopetalum chinense* Rehd., *Vitis fagifolia* Hu, *Elaeocarpus hainanensis brachyphyllus* Merr., *E. yentangensis* Hu, *Sehima confertiflora* Merr. and *Sinojackia xylocarpa* Hu. The third fascicle will be published during this year and will contain illustrations of all or almost all known species of Chinese Lindens.—A. R.

<sup>1</sup> *Icones plantarum sinicarum*. Edited by Hsen-Hsu Hu and Woon-Young Chun under the auspices of the Science Society of China and the Department of Botany, National Central University, Nanking, China. 50 pp. 50 pl. F. Commercial Press, Ltd., Shanghai, China, 1929.









AEROPLANE VIEW OF THE ARNOLD ARBORETUM

1. Administration Building.—2. North Woods.—3. Bussey Hill.—4. Central Woods.—5. Hemlock Hill (and South Woods southwest of Hemlock Hill).—6. South Street Tract.—7. Peters Hill.